PLASTICS

A Periodical Devoted to the Manufacture and Use of Composition Products

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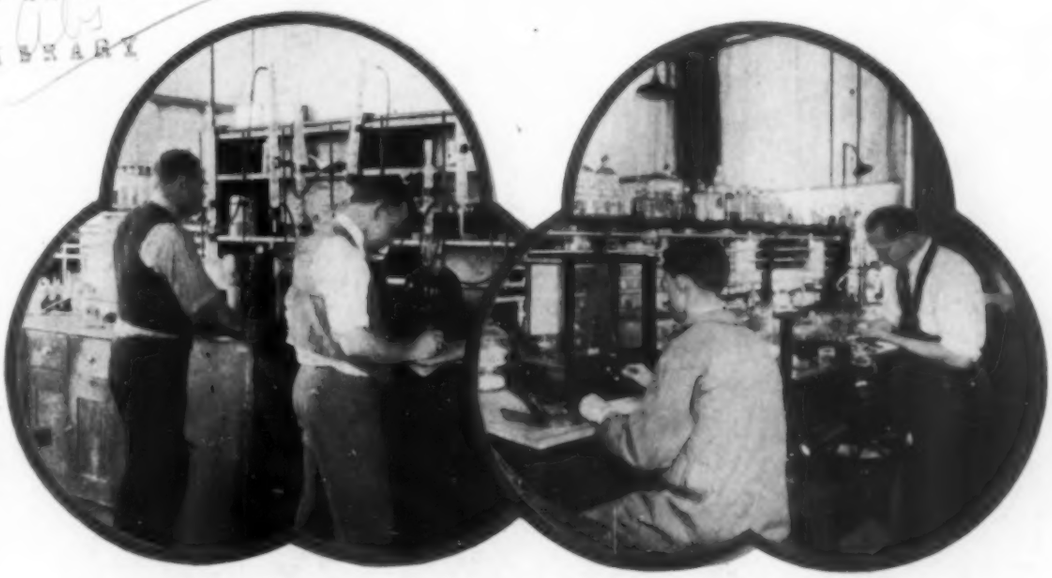

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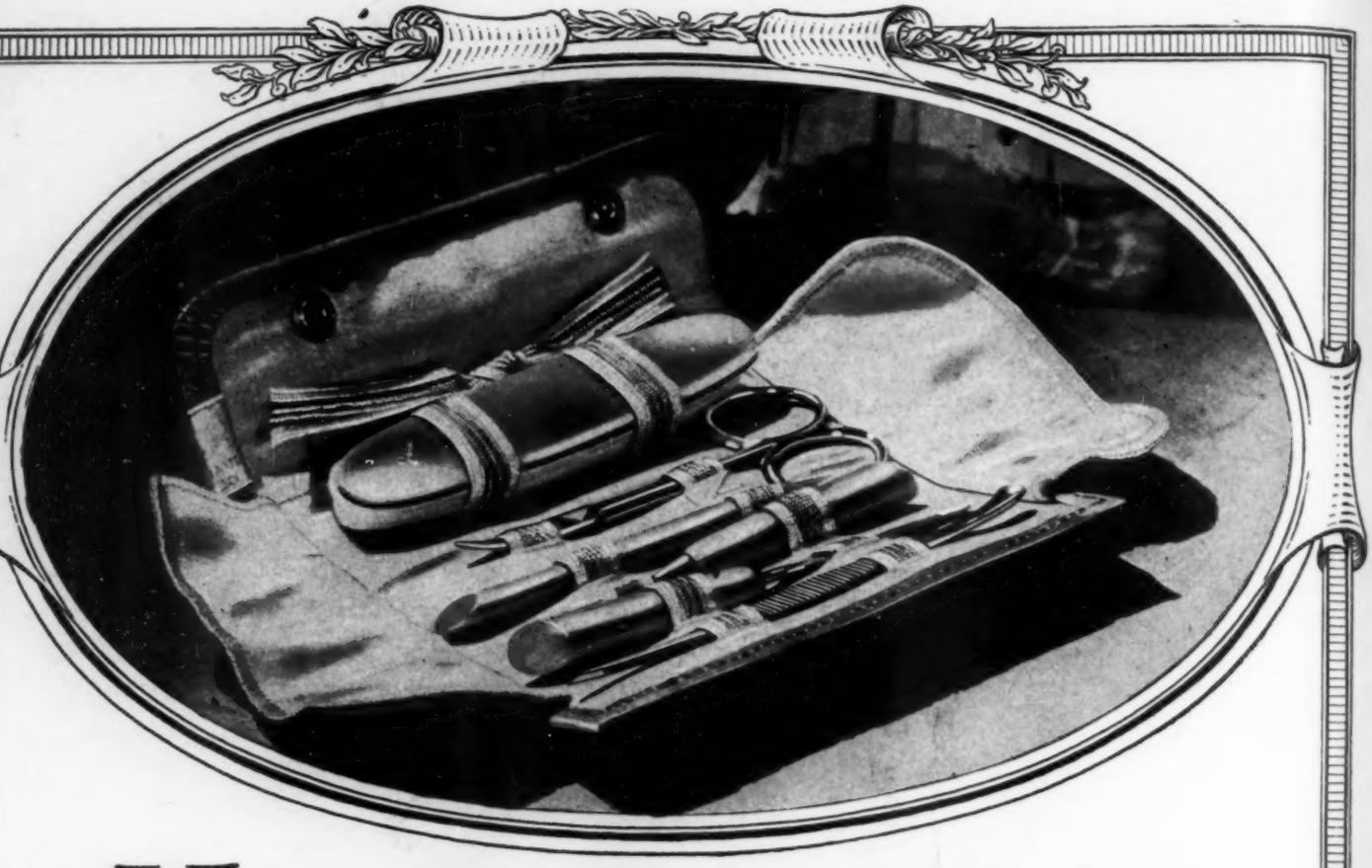

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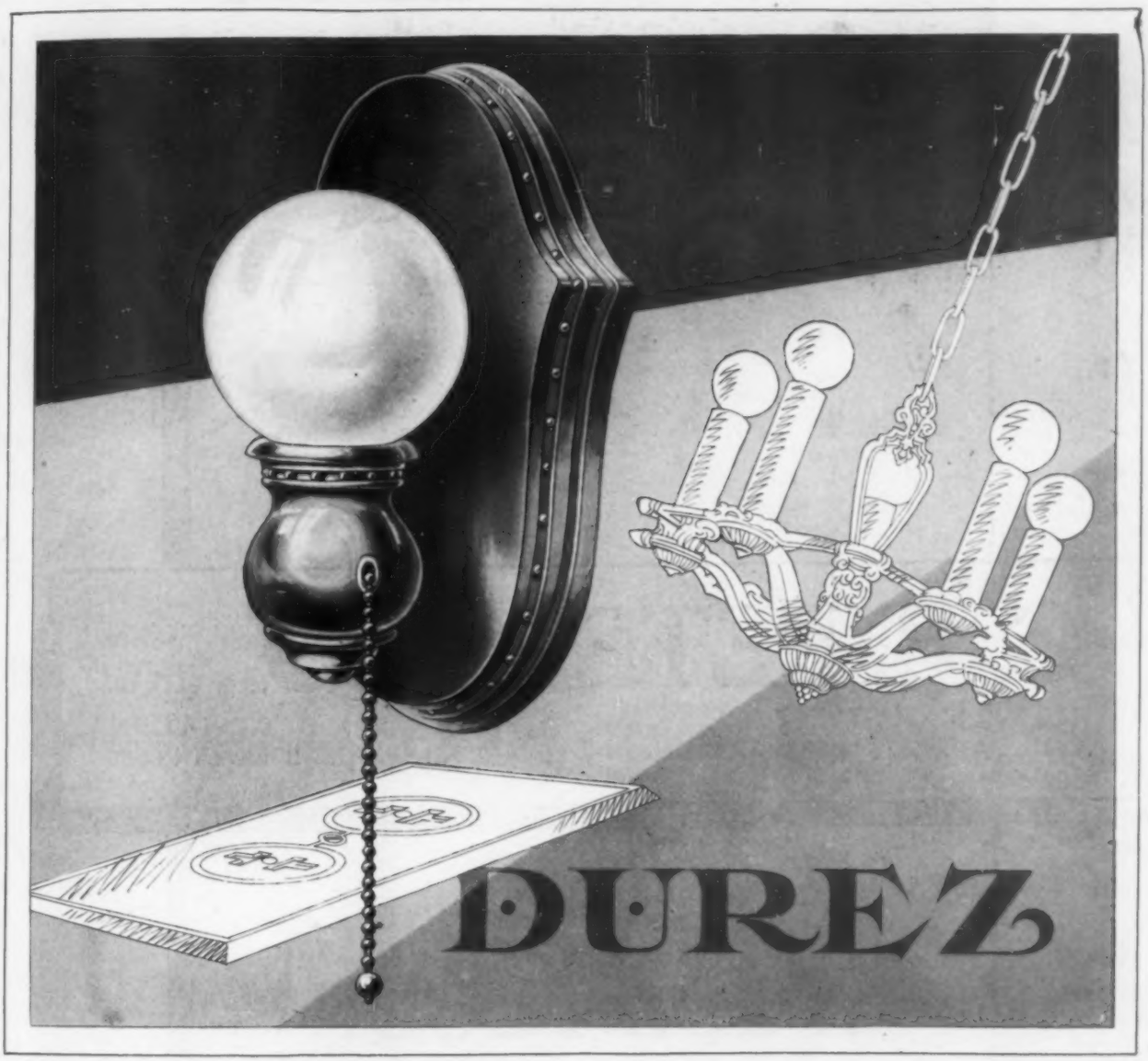

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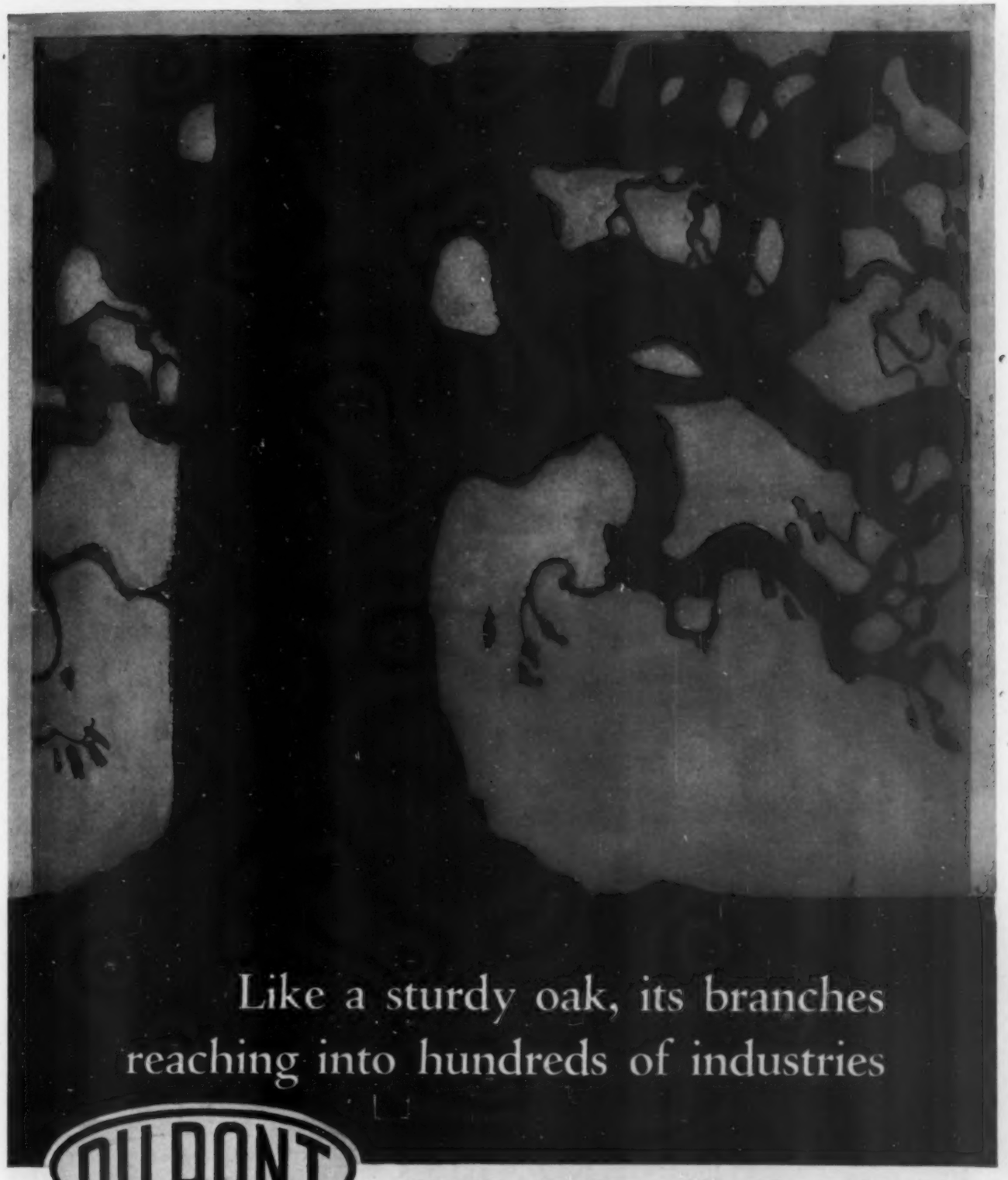

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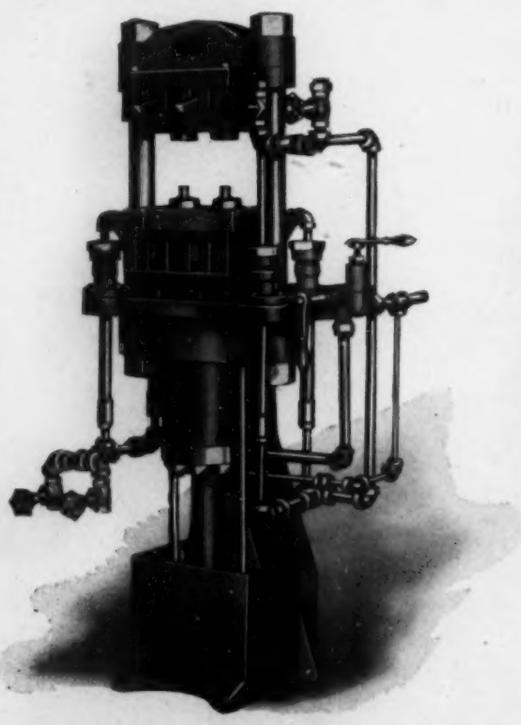

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AGAIN Plastics takes a step forward; larger in size, more comprehensive in scope, its definite policy of expansion has been relentlessly followed until today it is not only the recognized trade publication of the field it serves but also of the future growth and logical expansion of that field.

In the past, Plastics has been read principally by the molders and fabricators of the various composition materials. With the next issue it comes into the hands of a great and diversified new market—the manufacturers who use those materials for their various products. Over forty different industries and a tremendous increase in circulation are incorporated in this growth.

Obviously, for a trade paper to take such amazing steps, many elements must unite in its progress. The publishers take this opportunity of affirming their belief that not the least of these is an intelligent audience.

In other words the material offered by our editorial staff and the subject matter we have gathered have found an intelligent and appreciative group of readers, whose constant support and cooperation have enabled us to give you Plastics as it is today.

Furthermore a not altogether surprising success has attended the advertising campaigns conducted through the medium of Plastics. A noteworthy case of this was the recent announcement of "Protectoid", a non-inflammable product, a result which a certain sales manager brought to our notice in a congratulatory letter.

The Publishers.

PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 April, 1927 No. 4

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Reversed
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PLASTICS

A periodical devoted to the manufacture and use of plastic and composition products

Vol. 3 APRIL, 1927 No. 4

Shaping Celluloid Under Heat

Some of the numerous interesting activities at the plant of The Celluloid Company

By A. Moses, B. Sc., A. I. C.

The writer was recently accorded the privilege of visiting the Articles Fabricating Department of the Celluloid Company. In the present article, many types of hot-pressing celluloid are described from his personal observation.

IT was more than half a century ago that the original small nucleus of this plant first took shape, under the presiding genius of John W. Hyatt, the inventor of celluloid. From such unpretentious beginnings has developed the vast organization known as the Celluloid Company, a plant which today covers a large area in the heart of Newark's industrial district and is housed in strongly constructed, well lighted and airy brick buildings.

From a five-storey structure in Mechanic Street, Newark, its activities were transferred in 1875 to an old cradle factory, on the site of its present location, then on the outskirts of Newark. Later, in 1890, after a merger with its chief licensees, the original Celluloid Manufacturing Co. became known as The Celluloid Company.

The visit to the Articles Department began without undue formality under the skilled and kindly guidance of an official of the Research and Development Department. Some idea of the potentialities of the former may be gained from the fact that the Company lists between two and three thousand articles. The activities of the Articles Department lie in two main divisions, contract work for outside firms, and fancy goods. In this story our principal concern will be the shaping of articles for contract.

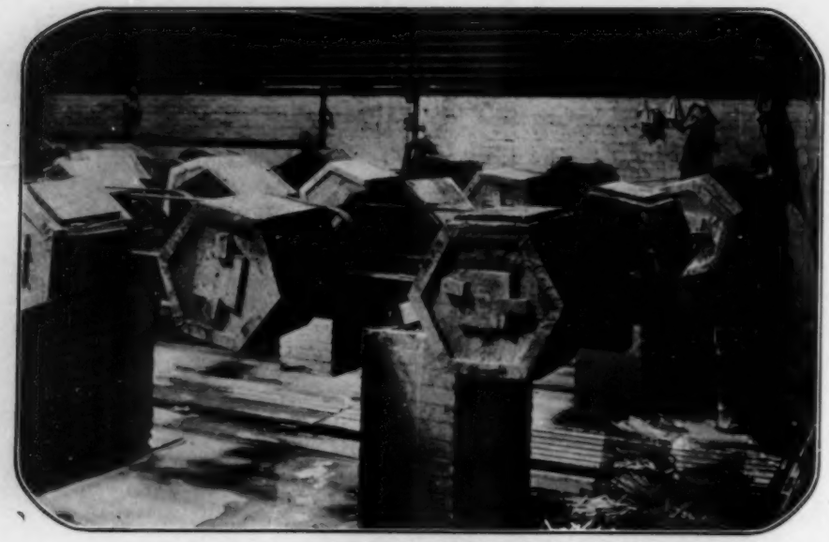
Cutting and Storing the Blanks

Organ key blanks were being prepared in the cutting room. To facilitate this operation and to avoid the formation of burred edges, the blank sheet stock is first immersed in water kept hot with live steam. Next the sheet is cut into strips of suitable width and the later fed to the blank cutting machine by hand. For such articles as jewel box tops, the blanks are punched out by a knife operated by a Toledo press, several softened sheets being punched simultaneously. For the manufacture of pressed and molded articles, sheet stock varying in thickness from 1.5 to .070 inch is available.

Blanks which cannot for any reason be worked up at once are sent to the store room. Here among other blanks collected in the bins, were rods for collar buttons, rings for register wheels, squares for poker chips and cash checks, drilled blanks for banjo keys and rectangular blanks for game counters. Worthy of special notice were jade rod blanks for pen holders.

Tumbling the Blanks

With the object of rounding off any sharp edges, which would otherwise leave lines on the finished part, the blanks are subjected to "tumbling," a process which may occupy anything from one hour to a whole day, depending on the size of the blank. The tumblers consist of rows of hexagonal wooden drums, rotated horizontally from a shaft driven by a centrally located electric motor. In these vessels the blanks are thrown one against the other in a medium usually consisting of pumice and water, and are then dumped into a bucket with a perforated false bottom. Some-



The Hexagonal wooden "tumblers" in which the raw edges are removed from the blanks prior to pressing.

times a mixture of grease and water is used, while the medium may be dispensed with altogether or the rounding off process may be facilitated by tumbling with balls.

Many Types of Hand Molding Used

Scales for pocket knives were among the multiplicity of articles being made in the Press Room, with a mold of the "flash two part," one operator caring for four molds each making twelve scales. Prior to use, both mold and rod blanks are heated on the steam table, the latter between the folds of a cloth. Next the inside of the mold is brushed with soapy water to prevent sticking, the blanks are placed on the cavities, the cover put on and the whole subjected to a pressure of about 2,500 pounds per square inch in a hydraulic press, where it is cooled off. Manicuring and razor handles may also be made in this way but machining these goods seems to have preference.

Collar buttons are formed in a strip from a blank in the "split shank bar type" of mold. Here, to facilitate removal of the strip after pressing, the bars come apart. A similar type of mold is used for forming poker dice, while guitar buttons are formed in the three plate mold. Pipe bits were being formed from tube stock in a mold provided with pin bars, the bone screw being inserted during the molding. One of the molds on this job had seen some thirty years of service. Pocket knife scales were also being formed in stationary molds.

Molding With Inlay

A process of much interest was the lettering of type keys, an operation which was in the hands of a very highly skilled girl operator. The letters which are stampings from sheet stock of .005 inch thickness are first glued on to the key then inlaid in a press.

Without being specific, it may be mentioned that nearly all the leading makes of automatic hydraulic molding presses were represented in the press room, and were busily at work turning out such items as register wheels, thimbles (from rod stock) and banjo keys.

Steam Blowing, Hot Water Pressing, and Stretching

One process under way in the Steam Room was the steam blowing of lather brush handles from tube stock, a fine array of vertical spindle presses being available for this job. After the press had been closed, steam was blown down the inside of the tube, followed by cooling off, removal of the tube and sawing off into the individual handles complete with screw threads. Other parts made in similar presses were ferrules for lather brushes and handles for whisk brooms.

Hot water pressing was also being carried out in this department, on such jobs as nail polisher trays, powder puff boxes, rattle balls, shoe horns, using thick sheet stock. As carried

An array of spindle presses for "steam" blowing shaving-brush handles, ferrules, and similar parts.

out here, the blank is put into a die, the latter placed in a hand press and the whole immersed in hot water, where the stock softens. As soon as the stock is plastic enough, the lever of the press actuates the "force" of the die. Dipping in cold water and removal of the overflow by turning or sawing off complete the process.

Still another process was on view here, viz. stretching as applied to the forming of tooth brush container bodies, pencil barrels and napkin rings. In this case a blank consisting of tube stock rolled from cemented sheet is heated under water and pushed onto a steel mandrel. On cooling the celluloid contracts and shapes itself round the "arbor," where it is colled off.

Dry Pressing

For the thinner sheet stock, there were two types of dry press in operation, hand and automatic. In this type of machine the "force" of the press is kept cold, the base plate is kept hot and the overflow scrap is cut off by the press itself. Transparent lever lids and germicidal soap boxes were amongst the articles being fabricated on these machines. In the same room toggle presses of a well known make were busy pressing out large trays two at a time.

Ashing and Polishing

A special room is devoted to "ashing," a process which consists in buffing the article with pumice on a muslin or felt wheel. Here, high grade soap boxes were being dull-finished and organ-stop keys straightened by lapping with pumice on a flat wheel. In special cases hand scrubbing follows the ashing process.

A feature of the polishing department was the deftness of the highly skilled operators, chiefly women. Of the three types of wheel in use, two are used on articles without any previous polish, viz a muslin wheel with tripoli paste followed by wiping on a soft flannel wheel. For articles which already have some degree of polish, a polisher intermediate between these two is employed with a drier polishing stone. Wiping off is dispensed with. An adequate exhausting system cares for the removal of dust.

Hot water baths and hand presses used for hot-water pressing celluloid articles.

Safety First Precautions.

All branches of the Fabricating Department are amply safeguarded against fire by the provision of fireproof construction, sliding fireproof partition doors and an adequate sprinkler system.

An outstanding feature is the provision of equipment for the removal of dust, steam and fumes from the vicinity of machinery. Dotted about the Department are boxes marked "suggestions,' an idea which has been very fruitful both to the Company and to many of its employees, while with a view to promoting efficiency, a bonus system is in vogue to reward production in excess of the ordinary. Signs are not lacking that the Company's recent reorganization is bearing fruit, a good omen for the Celluloid Industry. In conclusion thanks are due to Mr. Charles F. Reeves, Vice President and General Sales Manager, and to the Department of Development and Research, for their courtesy and kindly co-operation.

(*Concluded on page 157*)

Some Actual Applications of the Casein Solids

THE uses of the casein solids are contiually upon the increase. The following is an alphabetically arranged list of the known and actual uses of this versatile incombustible plastic material:

Ash Trays
Auto Instrument Boards
Badges
Bag Frames
Bangles
Beads
Bell Push Buttons
Billiard Balls
Bridge Score Pad Holders
Brush Trays
Bushings
Buttons
Candle Sticks
Cheap Jewelry
Cigarette Cases
Cigarette Holders
Clinical Thermometer Cases
Clock Cases
Coat Hangers
Combs
Cribbage Boards and Pegs
Crochet Hooks
Daylight Screens
Desk Sets
Dice
Dominoes
Door Knobs
Door Plates and Knobs
Dress Hangers
Electric Cigarette Lighters
Electric Insulating Material
Electric Lamp shades
Electric Push Plates
Fancy Bottle Tops
Fancy Knobs
Fountain Pens (Caps & Barrels)
Hair Brush Backs
Hand Mirror Backs
Handles (Carving Set, Elec. Iron, etc.)
Instrument Handles

(*Continued on page 174*)

Resorcinol-Starch Films and Plastics

Further research on the chemical effects of dihydroxy phenols on carbohydrates may reveal possibilities for further extension of Plastic Materials

By Joseph Pokorny

From Kunstoffe, 1927, 17, 31

According to a recent article in the German periodical "Kunststoffe," there appears to to be some possibility of the production of films and transparent plastic masses from the interaction or condensation of starch and resorcinol. The latter substance is meta-dihydroxybenzene, a water-soluble phenolic substance. It has been condensed with aldehydes into useable phenolic resins in the past, but the substances described by Mr. Pokorny appear to be something new. The author is publishing his results for the benefit of other workers in this field, in the hope that the discovery made by him may be developed further. The present article is a condensed account of the original German publication.

RESORCINOL, $C_6H_4(OH)_2$ (meta), is a highly reactive substance, and I found that it was quite useful in enhancing the printing qualities of starch-thickened textile - printing pastes, and that it also materially assisted in the dyeing of cellulose acetate silk. These considerations led me to experiment upon the effect of resorcinol upon cotton, and I found that when cotton was immersed over night in a solution of 1 part of resorcinol and 1 part of water that it would acquire properties somewhat analogous to those possessed by mercerized cotton. Cellulose acetate silk when thus treated became completely deacetylized. I further found that colored cotton goods when treated with a 6% aqueous resorcincol solution, and then treated with the usual hydrosulfite reserve pastes would give much more brilliant coloration. Another interesting observation is that when dissolving one part of resorcinol in 1 part of water the temperature is lowered appreciably, as from 23°C to 10°C.

Action Resorcinol on Starches

The apparent marked action of resorcinol upon cotton led me to experiments with its action upon the starches. My main object was to produce a starch-thickened textile-printing paste, and especially one which would lend itself to the fixation of metallic powders upon cloth by printing processes. For this purpose I stirred 70 grams of resorcinol with about 120 grams of a commercial starch-dextrin thickening paste. The first effect noticeable was a considerable lowering of the temperature, and the change in appearance of the starch. Although the "body" of the substance did not change appreciably, the final reaction product proved to be a tenaceous resinous substance. When allowed to stand over night, or even for a further 24 hours, its appearance did not change appreciably. When boiled with water, the mass produced a sort of milky turbidity in the water; and the substance did not serve to fix metallic powders upon cloth so that they would be water-proof.

To test further the material which I had produced, I spread some of it upon a glass plate and allowed it to dry in a laboratory drying oven for 2 hours at from 200 to 250°F. This produced a fine, homogeneous transparent film, entirely insoluble in boiling water, or in alcohol, or ether, or benzine, apparently unchangeable by these reagents. Even only one hour's drying at 240°F. yielded a similar film or plastic material. When I attempted to dry a thicker film of this resinous substanceI did not at first obtain a uniform film, and the same was not quite transparent and was slightly soluble in water, yielding a turbid solution. If it were dried, however, for several hours at from 240 to 270°F. I again obtained the already described homogeneous transparent and insoluble product.

The starch mixture which I had employed consisted of corn starch, dextrin, tapioca starch, stearic acid, glycerol and olive oil, the last three ingredients however in very small amounts. My next attempts were to ascertain the best type of starch for the purpose of obtaining these products, and it soon became apparent that dextrin alone would not give any practical results. Due to pressure of other work I was unable to follow the matter further at that time.

Eastman Co. Approached

Although I had never before worked with films, I nevertheless recognized the possible technical advantages of the material. I had discovered, and I therefore offered to sell the idea to the Eastman Kodak Co., at Rochester, N. Y., giving them information to the effect that the film had been made from a material widely used in the textile-printing industry, and also that my material was free from nitrogen and either incombustible or at least quite uninflammable. The Eastman Kodak Co. replied to my letter of Aug.

5, 1923, under date of Sept. 17, 1923, to the effect that

> "We have completed our investigation of the samples of film base that you submitted. We fail to find any points of superiority in this base over similar materials which can be produced by processes already known to us. We should not therefore be interested in acquiring any rights which you may have to offer in this respect. . . . ."

This unfavorable reply, however, was considered by me as a sort of compliment, as apparently I, although entirely unfamiliar with photographic films, had produced a film base which, according to the judgment of this well-known firm, was not inferior to their regular product. Furthermore, this company advised me to patent my product and then to submit the proposition again, a suggestion which I have, however, not been able to follow. I then succeeded, however, in making an agreement with the Goerz Photochemische Werke, at Berlin-Zehlendorf, Germany, with the idea of developing the material further. In accordance with this agreement I forwarded a sample of the same material which I had sent to the Eastman Kodak Co., to this German firm, shipping it from Providence, R. I., on March 27, 1924. On May 3,, 1924, I received a reply to the effect that all that arrived at the Goerz works was a completely decomposed brown mass, so that evidently my material was not a stable substance. On June 21, 1924, the Goerz works informed me that all of their attempts to produce the substance had resulted in failures, and requested me to furnish them a sample of the tapioca starch and the dextrin which I had originally employed. As I was no longer connected with the firm at whose plant I had conducted my experiments, I was unable to accede to this request. Although I also sent some of the resinous material from which I had made my film to the Goerz Photochemische Werke, and the latter reported that they had experimented with all available German starches and the like, they stated that useable results had not been obtained. Their last leter, Nov. 21, 1924, said, among other things, that they did not exclude the possibility that "under certain circumstances a film might be obtained, but that it would probably not have all the desirable qualities which would be demanded of a commercial product, etc."

Although circumstances have prevented me from going any further with this matter since July, 1923, I nevertheless think the directions I sent the Goerz Co. in 1924 sufficiently valuable to bear publishing as other workers in this field might obtain some valuable results from these leads, as several of my technical observations, made as long ago as 1893 were afterwards found to be entirely correct. I hope that the present disclosure will likewise lead to something worth while.

Directions

The directions furnished by me to the Goerz Photochemische Werke are, literally, as follows:

"Into an ordinary cotton-printing color paste base produced by boiling a mixture of 145 grams dextrin, 52 grams cornstarch, 104 grams tapioca starch, 2 grams stearic acid and 900 grams of water (or about 1200 grams in all), there were introduced 700 grams of powdered resorcinol. A decided lowering in temperature results. The mass is stirred thoroughly and continuously. The pasty appearance of the mixture soon disappears and the presence of numerous bubbles in the mass shows that some reaction is going on. After standing for 40 hours, with stirring, the mass will acquire a rubbery or resinous consistency. If this mass, which now will be found free from bubbles, is applied in a thin layer to a glass plate and allowed to dry for a few hours in a laboratory drying oven at from 200 to 250° F, it will yield a clear, transparent film, insoluble in boiling water, alcohol, ether and benzine."

(*Concluded on page 175*)

A New Swing Joint for High Pressure Steam

A movable steam connection of some kind is an important requisite on most types of molding presses, as it enables the platens to be swung apart or separated without interrupting the steam supply.

The swing joint, the constituent parts of which we illustrate, is a comparatively new type and simplicity of construction is one of its important features. Consisting of four parts only, the use of ground connections or spring joints is avoided, while steam tightness is achieved by means of a formed resilient seal. The latter is mechanically compressed between two highly machined surfaces and is held in a state of inflation by the steam pressure in the connection itself.

Showing the simple construction of the joint.

One claim made by the design, which is patented, is that a full and uninterrupted flow of steam is always assured no matter at what angle the joint is swung, an essential consideration for the maintenance of the platens at an even temperature level.

Brass construction is used throughout and it is claimed that besides steam, the joint can be used in systems conveying compressed air, water, oil, and most fluids which do not cause the deterioration of brass. The Flexo Supply Company, St. Louis, Mo., are the manufacturers of the appliances.

The Manufacture of Casein Solids

III. Precise details of the manufacture of plates from extruded rods and from powder given

By Heinrich Prehn

Consulting Engineer; German Correspondent of Plastics

Previous articles have described, with a wealth of detail, the grinding of casein powder and the extrusion of rods.

THE exact type of construction of the presses, the question as to whether internal sieve-type of resistances, extension pieces having smaller sieves, break-discs or the like should be included, either separately or in combination, depends entirely upon the kind of product being made. Only experience is a reliable guide, and in the absence of this it is safer to call upon someone who has had thorough experience in the production of casein solids. The correct solution of these various problems makes it possible to save considerable power and time in extruding casein rods or tubes, and not the least of the advantages is the attainment of the correct density of the material produced in the manufacturing operations.

The power-consumption per extrusion press varies with the different presses made by various manufacturers, but lies between 5 and 8 horse-power for single presses and approximately 15 H. P. for multiple presses. A common source of power has a certain advantage in this case as it allows for equalization in the load on the power when the different machines are taking varying power to drive them. However, individual motor drive has also certain advantages, as in the latter case the continual stretching of the belts and the resulting interruptions in the operation while they are being tightened, somewhat makes up for the increased expense of installation.

This practically completes the instructions regarding the extrusion of rods which furnish the raw material for the manufacture of beads, imitation coral and the like. One more point which should not be overlooked is that the rod should issue clean and straight, and should be cut into nearly uniform length (about 3 feet). The freshly extruded rods should not be exposed to the air any more than can be helped, and they should be sprinkled with soap-stone or talcum powder to keep them from sticking to each other.

Extruding Hollow Rods

As regards the extrusion of hollow rods (i. e. tubes), by the use of special mouthpieces and nozzles (having channels and cores), there is not much that can be said that differs essentially from the manufacture of rods. Special types of machines are offered by various manufacturers, but a recounting of these would be not only tedious but without particular interest in the present connection. The same general precautions already discussed must be taken when making tubes, except that even greater care is necessary in this case.

After the indurating and hardening of the rods and tubes, and which is the subject of a special chapter, as this is an extremely important operation, it will usually be found that irrespective of all the care that has been taken that some of the rods or tubes will nevertheless be found to have warped. This, unfortunately, can not be avoided. With the more or less primitive appliances thus far available the straightening of such rods or tubes was quite difficult. However, fortunately, considerable progress has been made within the past few months, and it can now be confidently asserted that the straightening problem has at last been satisfactorily solved. A recently patented rod and tube straightening machine is illustrated in our figure 7 on page—.

This machine effects the straightening of the casein solids rods by rolling the slightly heated rods or tubes between three rollers while under pressure, while at the same time they are gradually cooled. The machine is emptied by throwing a lever, worked by a foot pedal, and this releases two of the three pressure rollers from the third roller, which is the driver, the other two rollers being idlers.

The capacity of this type of straightening machine is very great and the results are excellent. The yearly capacity of such a machine, calculating 300 working days, varies from about 90,000 kilograms (200,000 lbs.) of rods about 25 mm. (1 inch) thick; about 60,000 kilograms (133,000 lbs.) of rods from $\frac{5}{8}$ to $\frac{7}{8}$ inches thick, and about 20,000 kilograms (44,000 lbs.) of thin rods, or an average of

from 30,000 to 40,000 kilograms (66,000-80,000 bls.) The total cost of straightening the rods is very low, and should average about one cent a pound, inclusive of amortization, power, labor, etc. The cost of the machines is not high and the advantages obtained by straightening otherwise warped rods is out of all proportion to the cost.

Another defect usually found in casein solids rods when first manufactured is that they vary slightly in diameter at different points along their length. This defect is overcome by grinding the rods or tubes on a special rod-grinding machine, such as that known, in Europe, as a "Koh-i-noor" type of machine, and which is illustrated in figure 8. This machine grinds the rods until they are absolutely uniform in diameter, and although some consumers prefer to do their own grinding, it will pay the manufacturer of casein solids to invest in some of these machines as uniform goods can then be offered to the consumer.

Another machine that is very useful, especially for plants that fabricate casein solids articles from rods and tubes is an automatic rod-sawing machine. This will handle rods up to 32 mm. diameter (1¼") and will cut slices up to 60 mm. thick (i. e. 2⅜"), with a capacity of from 30 to 50 cuts per minute. As the action is entirely automatic and the slices are perfectly uniform in thickness, one operator can take care of four of these machines. The power to operate the sawing-machine is about ¾ H. P.

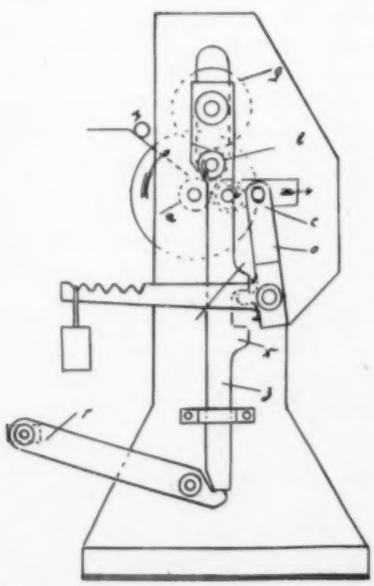


Fig. 7. Machine for straightening casein solid rods.

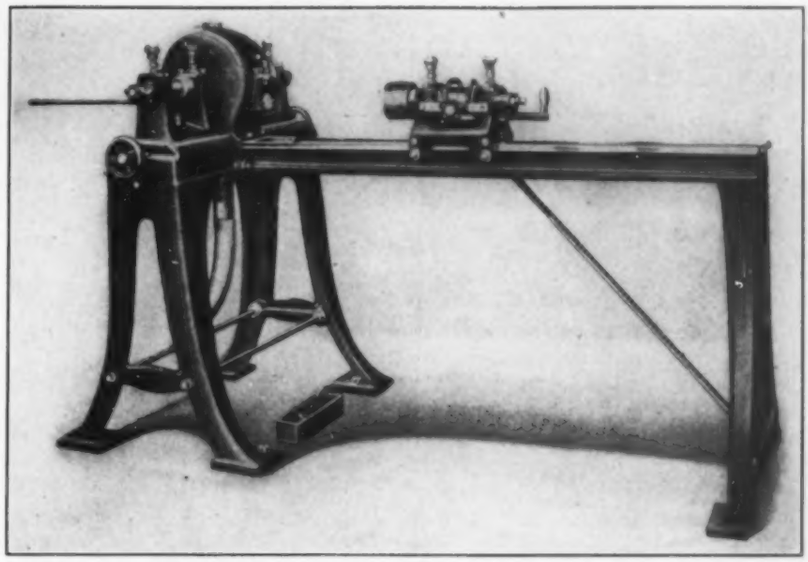


Fig. 8. Machine for grinding casein rods to a uniform diameter along their whole length.

Plates.

By far the greater amount of freshly extruded casein solids rods is not indurated in that form, but is immediately worked up into plates. Plates are by far in greater demand than rods, as they lend themselves to many different types of operations and can be worked up into many articles. There is another method of making plates, but this will be taken up later on.

For the molding of plates or sheets from extruded rods, multiple platen hydraulic presses are employed. In addition to the presses themselves, the usual hydraulic accumulators and pumps are required. At the present time we will take up the preparation of the plates from the rods.

The diameter of the rods to be flattened down into plates requires a careful choice, as this may vary from rods as thin as 8 mm. to rods as thick as 22 mm. or almost an inch thick. The color scheme, type of mottle, or if semi-transparent horn-like casein solids plates are to be made are the deciding factors in the choice of thicknesses. When uniform colors are to be made, there is no great difficulty, but when fancy color effects, and especially pretty mottles are to be produced, very careful attention must be given to the types of nozzles used when extruding the rods, so as to get the effect desired. It is in this particular field that experience is the most valuable teacher, and where an expert can save a great deal of time and worry, and needless trials.

Another point that must be closely watched is the proper length of the rods to be pressed into plates, and especially to the pattern in which the rods are placed in the chase or frame that gives the finished plate or sheet its final form.

The rods which are to be pressed into sheets or plates must be treated in a special manner to prevent deterioration prior to the flattening operation. The first point is to keep them in boxes or containers so that they will retain as much as possible of their natural heat when they come from the extrusion presses, for if the rods are exposed to the air for any length of time a thin skin will form over the surface of the rods, and this

(*Continued on page 170*)

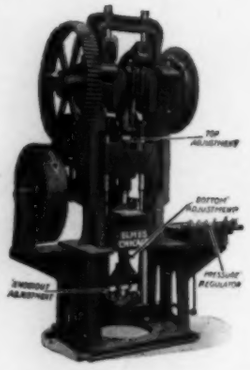
Large Preforming Presses Apply Pressure at Top and Bottom of Material

FOLLOWING our policy in reviewing from time to time the various meritorious mechanical appliances and devices employed in the production of molded products, so that the comparative novice in the field of fabricating such material, as well as the more experienced operator, will have a handy reference work, we are taking up this month the more recent types of preforming or tabletting presses.

The use of preforms has so many advantages in the molding of phenol resin products over the older method of charging the powder direct into the dies, that the progressive molder now uses preforms wherever possible as this means less waste, less handling and a better product—but the preforms must be uniform in size and density.

The use of several small tablets does not solve the molder's problem; a single preform should be used wherever possible—and this requires a much heavier Preform Machine than the ordinary pill machines very commonly used for small size tablets. The more modern type of preforming press will make preforms up to nine square inches in area and of uniform density.

Attempts to make satisfactory tablets on mechanical presses which operate on the principle of "impact" are satisfactory, for certain sizes, which necessitate a pressure type of press. This is owing to the fact that on thick tablets, anything in the nature of a sudden blow will tend to cause laminations of the material with excessive density on top of the tablet and a gradual reduction in density towards the bottom.



Preforming press for large preforms.

Such presses, having no means of regulating the force of the blow, have the draw-back of exerting too much pressure on tablets of a smaller size.

The present automatic preforming press can be regulated to give pre-determined pressures which are established by the operator to suit the particular size of tablet that he is making. Automatic feeding and discharge relieve the operator from all labor, with the exception of keeping the powder hopper full and taking away the finished product. Most molders arrange trays or pans where they are taken away as filled.

This preforming press has been developed by the engineers of the Charles F. Elmes Engineering Works, of Chicago, Ill., and according to the reports of a number of users, the press is giving satisfaction.
tion.

In a forthcoming article of the present series we shall take up some of the methods employed in accurately placing inserts when molding phenol resin products.

To make large preforms of a satisfactory and uniform density, it is necessary to apply pressure on both top and bottom of the material. To obtain this result several novel features, which cause the pressure to be exerted through the entire material mass, forcing the tablet downward a slight distance against a yielding resistance have been developed. This yielding resistance can be adjusted to give practically any predetermined pressure, and to overcome this pressure necessarily involves the same pressure being applied through the tablet.

The yielding resistance for supporting the bottom plunger of the press is essentially a hydraulic cushion cylinder, that can be served from any available hydraulic accumulator system, but where users do not have any hydraulic system, a very small accumulator can be furnished which can be charged as occasion demands by means of a small hand pump. The loss or wastage of hydraulic pressure liquid is negligible and confined entirely to such losses as may occur from leakage.

(*Continued on page 185*)

European Toilet-ware Industry Suffers Depression

THE pyroxylin plastic industries in the countries which formerly were a part of Austria-Hungary and certain sections of Germany are by no means in a prosperous condition, as is evidenced by an article in the Celluloid Industrie Supplement of the German "Gummi-Zeitung" (1927, 41,-961).

It appears that the bobbed hair craze has actually caused a crisis in this industrie in the former Central Empire states of Europe. The former customers of the Austrian manufacturers are now, due to the newly established countries, in foreign territory, and the sale of pyroxylin articles is severely

(*Continued on page 184*)

Increasing the Plasticity of the Phenol Resins

Dryness of molding powders overcome by use of furfural so that better preforms result

A novel application of this once rare product is described, one of peculiar interest in the plastics field.

A RECENT patent U. S. P. 1609506 Dec. 7, 1926) assigned by Frank P. Brock to the Bakelite Corporation, covers a method for improving the plasticity of phenolic resin molding compounds of the potentially reactive type, and is applicable whether the deficiency in plasticity has arisen out of or in connection with the manufacturing procedure, or whether it has developed, as sometimes occurs, in molding mixtures which were initially of satisfactory quality. It is known to those familiar with this art that phenolic resin compositions have a tendency to become "dry," or to lose plasticity, to the extent that they are no longer suitable for pre-molding the so-called "biscuits" for use it hot-press molding of complicated or intricate designs, or for the direct hot-press molding of such designs. Phenolic resin compositions, whether in powder or granular form, or in the form of sheets of paper coated or impregnated with the resin, often reach such condition that they can be employed only for molding the very simplest articles, or at times must be discarded as useless or mixed with fresh materials of higher plasticity. From the foregoing the desirability of a plasticizing agent which can be merely mixed with the powdered or granular material, or sprayed on or otherwise applied to the paper, and which when so applied will improve the molding quality, without affecting adversely the quality of the molded product, will be obvious.

Mr. Brock has discovered that **furfuraldehyde (furfural) when added in suitably restricted proportions** to potentially reactive molding materials exhibiting the above described deficiency in plasticity, and properly incorporated therewith without substantial chemical reaction, has the desired effect of improving or restoring the molding quality. The quantity so used will depend upon the original condition of the material to be treated, but is relatively small, seldom exceeding 15% by weight of the molding material, and being often only 1-5%. The exact amount is readily determined by simple test, and the result is attributable to the remarkable and indeed unique mutual solvent relation existing between furfural and the phenolic resins of the potentially reactive type. By phenolic resins of the potentially reactive type are meant such resins as contain sufficient methylene-containing hardening agent to determine their transformation to the infusible state upon application of sufficient heat.

Incorporating the Furfural

Any desired method may be used for incorporating the furfural with the phenol resin composition. In the case of molding powders or granulated materials it is sufficient to agitate these in a suitable apparatus of the type of a flour blender, in presence of a spray of atomized furfural: or the plasticizer may be introduced in a kneading machine, or under mixing rolls, the furfural being sprayed upon the material until the desired degree of plasticity is attained. In the case of coated or impregnated papers, the resin may be plasticized by simple spraying, dipping or like method. After this treatment of defective sheets it will be found that they are in all respects suitable for the manufacture of laminated stock by superposing and hot-pressure molding.

An especially valuable application of the present method is as follows:

Paper sheets, coated or impregnated with the phenolic resin, and more especially waste sheets or portions of sheets, are shredded in a cutter mill and then ground to powder in a ball mill or equivalent apparatus. Sheets containing resin of low plasticity are particularly well adapted for this powdering operation. The ground material is then charged into a mixer and plasticized by furfural as already described.

"The Story of Colasta"

See May PLASTICS

EDITORIAL · IMPRESSIONS

"Welcome Stranger!"

THE attention of America's reading public has been forcibly directed to the alleged profits or losses (depending upon which side the argument is on) of cooperative marketing associations as a result of the notorious Sapiro-Ford libel suit. Some favor the plan, others violently oppose it. The probabilities are that both are right in some phases of the controversy.

A somewhat similar cleavage of opinion appears to exist in the field of plastics, and one hears much of the relative merits or demerits of cooperation between various groups of manufacturers, fabricators or even consumers. Likewise, the protagonists of the various plastic materials are usually loud in their praises for their particular product, and by no means reticent in condemning or belittling the other "competing" materials.

Now just what is the truth in most of these statements? Why there should be any ill feeling between different groups of interests in the domain of plastics is not hard to see, but why they should be kept up indefinitely is difficult to understand. There is much, very much indeed to be gained by frank recognition of the value of the "other fellow's" contribution to the progress of the art in general; and it follows as the day does the night, that whatever helps the industry in general will, in the end, redound to the benefit of every one engaged in it.

Formerly, and we might almost say "just yesterday," whenever a new article came along, the producers of the material already on the market reacted to it in just two ways: either they decried it as "just another one of 'those things'," or they damned it with faint praise, or ignored it altogether, hoping that by some miracle the rest of the world would fail to hear of it and that it would hence die a natural death.

No real effort to *meet* the competition caused by the new product was put forth; unless it was the doubtful expedient of price-cutting. Many of the older men in the industry will probably recollect the first reaction of the makers of natural horn and ivory against the introduction of the pyroxylin plastics; and the determined fight waged by the makers of hard-rubber dentures against the invasion of that field by the pyroxylin materials. But did the coming of the new hurt the old? Not a bit of it. Today hard rubber (simply as an example, if you please) is enjoying as much popularity as ever, as there are certain uses for any given material for which it is more suited than anything else.

The New Plastics Arrive

Did the coming of the phenol resins wipe out the natural amber industry? No. And this simply because methods were developed to make up larger pieces of natural amber from smaller ones, thus putting the industry in a position to compete with the synthetic materials.

When the casein plastics first made their appearance abroad, much was said upon its possible effect upon the pyroxylin industry; but the latter prospered as never before; and, in fact, most of the European manufacturers of the older material took up the making of the new.

The same state of affairs is true of present conditions. As new materials appear, they find their natural level of commercial utility based purely and simply upon their ability to do some one thing just a little better than any other material offered for this purpose before. Before long it is found that by showing a new use, for example, that some of the older materials are also useful for this new use, and as a result of all this, the consumption of both the old and the new materials increases.

We believe that every new and meritorious contribution to the already numerous family of plastic materials is to be welcomed on the part of everybody in the molding or fabricating industry, and by the ultimate consumer as well; as it furnishes some new material which may have a certain property not yet found in what is already known.

Every alert member of the industry should be willing to give a new material an honest trial to see if or not it will serve his purposes. This not only stimulates invention, but also keeps the individual or the concern with whom he is connected from getting into a rut. The only *real* way to "beat competition" is to keep abreast of the times, and to do something "just a little bit better than the other fellow."

Cooperation, which in this case means *Exchange of Ideas* is, the best spring tonic that the plastics industry can take to rid itself of the rheumatic creakings caused by lying too long in a cramped position in the dark unventilated corners of Secrecy.

PLASTICS

Reversed

JUST as we go to press we receive the information, shown on another page, that the decision in the patent suit between the Bakelite Corp. and the Brunswick-Balke-Collender Co. over the manufacture of phenol resin billiard balls has been reversed by the Appelate Court, and that it now appears as though the ball manufacturers

were adjudged after all to have infringed the basic phenol resin patents.

It should be remembered that the patents in this suit have since expired, but also that the court in no way questioned the *validity* of the patents, as this had been sustained in a number of cases before. The question at present in issue was purely one of *infringement*, and this the lower court had decided had not been the case.

All this again shows the value of patenting a process, or product, rather than attempting to carry it out in secret. Who doubts that the real success of the Bakelite Corporation is due to anything but their enlightened patent policy, plus the intrinsic merit of the materials discovered by Dr. Baekeland? Had the forerunners of the present organization chosen to keep their processes "secret", it is very much to be doubted if the progress made by this industry would have been as great as it is.

Now that the patents are open to the public, everybody gains by the transaction; first the company by enjoying a monopoly for 17 years during which research could be carried on; secondly, the public by reaping the benefits of the disclosure in the patents. There is nothing that has served better to build up our American industries than the patent laws of our country; even though they may work apparent hardship on some who get entangled in their intricacies.

Properly drawn and defended, a valid patent contributes not only to the prosperity of the inventor, but also to that of our whole people.

Now ask me Another!

A RATHER amusing "game" is sweeping the country, especially in the newspapers, consisting in a daily list of "questions" which are to reflect, more or less, the erudition of the interrogated party. Nine times out of ten they are catch-questions, which can only be answer-

(*Continued on page 173*)

An announcement

BEGINNING with the May issue, a sixteen page supplement entitled "MOLDED PRODUCTS", will be added to PLASTICS.

This special section will be devoted to the purchase, further use, and merchandising of all manner of parts molded from composition materials.

For the first time in the history of this rapidly expanding industry, a determined attempt is being made through "MOLDED PRODUCTS" to disseminate helpful information, discuss and answer intricate problems and, best of all, create a larger and more universal use of these products.

So as to achieve the widest practical results, the entire magazine will be sent to an extensive, selected list of present and prospective users of molded parts. These readers will be in at least 30 major industries with new industries being added as fast as a possible new market is developed.

"MOLDED PRODUCTS" in PLASTICS will be edited exclusively on that subject and only advertisements of concerns who are molders will appear in its columns. It is the supreme medium to carry the sales message of such firms to their **complete, possible market.** Naturally as space is limited, we suggest your wiring for advertising rates to

PLASTICS

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Plastic Possibilities of Sea-Weeds

Agglomerating properties of alginic acid allow of its use in molded products

By Carl Marx

Gathering seaweeds for "ashing" into "kelp" is an ancient industry. Some more modern applications of the weeds are indicated here.

AMONG some of the products lavishly bestowed by a kind providence, and to be had, literally, for the mere harvesting, are the unbelievably enormous amounts of seaweeds thrown upon the shores of both the Atlantic and Pacific coast lines of the United States.

While certain types of these marine products are more abundant at some points than at others, the occurrence of large quantities of seaweeds is familiar to every sojourner along the extensive coast-line of our country. In the East, and especially along the Massachusetts and Maine coast, a rather broad-leaved, tough and leathery sea-weed is most in evidence. It is known by many names, depending upon the locality, and for this reason some people are under the impression that there are in reality a great many more types than actually proves to be the case.

The commercial utilization of these seaweeds is an old and venerable industry, especially abroad, and under the common names of "kelp" "varec," "wrack," "sea-tang," "sea-tangle," and the like, these seaweeds have been gathered for centuries. Mostly, however, the weeds have simply been dried and burnt to produce the ashes, termed "kelp," and these are valuable on account of the potash and iodine contained in them. For many years the entire world supply of iodine came from kelp, until the discovery of iodine in some of the mined salts found in various countries seriously crippled the industry.

The natural sea-weeds, either dried or wet, were also used directly as a fertilizer, and this is still being done in Massachusetts on a large scale, and hundreds of tons of what is incorrectly termed "kelp" is gathered every year especially in the vicinity of Scituate, Mass.

A regular industry has grown up around the gathering of these sea-weeds, which are sorted out into several kinds narrow-leaved, dark "bladder-wrack" (*fucus vesiculosus*) which is useful mainly for producing an anti-obesity remedy; Irish moss (*chondus crispus*) which is highly prized as an article of food, especially in the form of jelly-like desserts or blanc mange: and "kelp" or sea-tang (*laminaria*). The latter is the most valuable from a plastic point of view, as will be seen shortly.

Stanford's Discoveries

Back in 1883 the noted British Chemist E. C. C. Stanford discovered that these sea-weeds, and especially the sea-tangle or *laminariae* contained an abundant supply of a carbohydrate type of substance to which he gave the name of *Algin* (from *Algae* aqueous plants), and which substance existed in the plants in the form of a water-insoluble compound with lime, or rather as the calcium salt, calcium alginate. Stanford found that this lime compound could be dissolved from the seaweed by treating the same with a dilute solution of ordinary soda-ash (sodium carbonate), and that it could then be precipitated in an insoluble form by the addition of an acid, or by adding some soluble calcium salt.

Stanford wrote several long articles on this subject in the Journal of the Society of Chemical Industry 1883, 1884, 1885), and also was granted a number of patents on methods of preparing algin. He fully recognized the value of the material, and showed that it could be employed in place of starch, and especially for making plastic materials, such as imitations of horn, ivory, bone and as a binder in conjunction with fillers.

Apparently Stanford was far ahead of his time, as the commercial development of the algin products had to await the coming of other investigators. About 1898, a Swedish chemist, Axel Krefting, independently took up the work of investigating the laminaria type of seaweeds, and by the use of more refined methods succeeded in extracting a purer form of algin from the weeds. He named his product after the Danish word for the laminaria, (namely "Tang," which is also the Swedish, Norwegian, and German word for this material) or "Tangic acid," and by analogy with the English term of Stanford, "Algin," this became "Tangin" or, to use perhaps a more scientific English transliteration,

(*Continued on page 179*)

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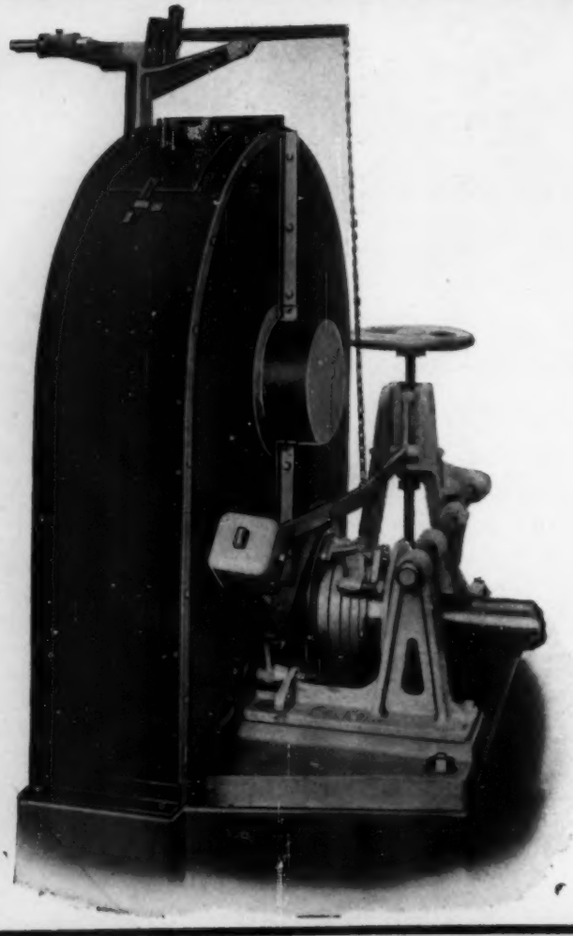

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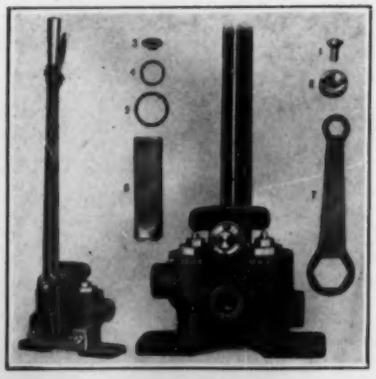

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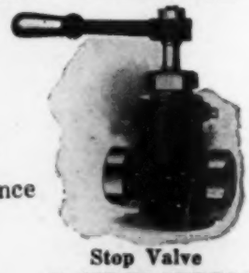

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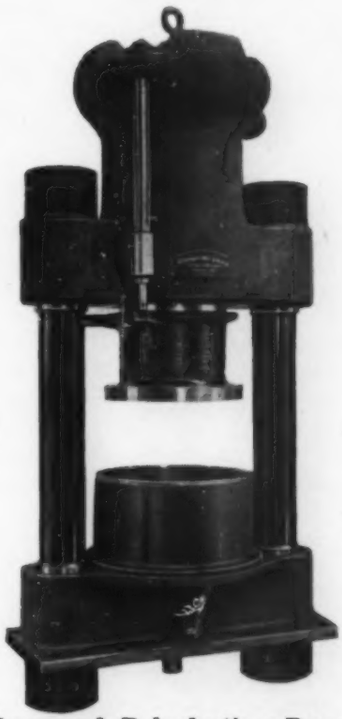

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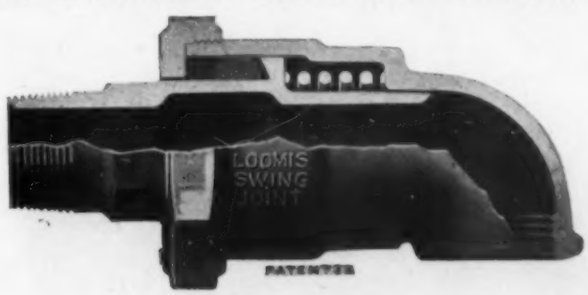

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Manufacture of Casein Solids

(*Continued from page 161*)

will prevent the proper union or blending of the rods into a faultless plate. If this precaution is not observed, there will be irregular markings on the plate, uneven swelling in the hardening bath and possibly even fissures and splitting in the finished sheets. The points where the rods merge into one another will be plainly visible if this skin is allowed to form on the rods before they are pressed. Such plates also exhibit definite cleavage lines and are very liable to break when being fabricated.

Temperature Important

Another prolific source of difficulty is caused by uneven or improper temperature when extruding the rods. If the temperature of extrusion, or the extrusion speed has been too high, the outer surface of the rods will be partly hardened, and the difficulties encountered when pressing such rods into plates are quite similar to those just enumerated. For these reasons especial attention should be paid to proper plant layout, and to the suitable routing of the material, and the adjustment of machine capacity to each other, so that there may be no "hold up" along the line of manufacture. In other words, the pressing capacity of the casein solids plant should be in proper relationship to the output of the extrusion or spindle presses.

Another important factor in the manufacture of casein-solids sheets or plates is the proper choice of chases or frames in which the plates are pressed between the plates of the multiple platen hydraulic press. It is surprising how little attention has been paid to this in the past. As the hydraulic press manufacturer evidently pays more attention to the platens than to the chases, many plants have used improvised chases which lead to crooked sheets, that require cutting and truing to make them saleable. The usual size of the casein sheets (in Europe) is 500x400 mm. (19¾"x15¾"). The inside dimensions of the chase, as well as its thickness must be somewhat greater than the dimensions of the finished sheets as there is a certain amount of shrinkage in drying. The exact amount of rods to be pressed into a plate should be carefully ascertained by experiment, as the density and uniformity of the sheets is largely dependent upon uniform charges per chase. It may surprise some of the uninitiated to learn that the weight required differs according to the color, texture and type of mottle. After carefully weighing up the exact amount of rod required per plate, the rods are either laid paralled, cross-wise or diagonal into the chase and on the platens, according to the type of mottle or color to be produced.

In pressing plates from casein solids mixed and prepared in calandering rolls, as mentioned earlier, the process is quite similar, except that the strips of casein solid cut from the rolled sheets are used in place of the extruded rods.

Plates From Powder.

An alternative method for the production of casein solids plates and sheets is to press the material directly into this form in hydraulic presses. The pulverized casein, mixed with various chemical, colors and water is placed within the chase of the hydraulic press and directly subjected to sufficient pressure to consolidate the material into a sheet. By adding suitably colored lumps of material, and certain chemicals, marbled effects can be obtained, and also the time of hardening considerably influenced. These are great advantages, and make this method of operating quite a lot cheaper, but the product is not as good as that made from extruded rods which have been welded into a sheet as already described above. For casein solids of the highest types, such as that used for making finecombs, the longer and more complicated process must be followed.

(This series of articles will be continued in an early issue, and as soon as we can obtain further copy from our European correspondent).

Celluloid Company Reorganization Successful

MR. ROBERT CAMPBELL'S presidential letter of March 12, accompanying the annual report to the stockohlders of The Celluloid Company, makes very interesting reading, in view of the reorganization of the Company.

That some measure of success has already been achieved is evident from such salient points as the following: Current assets are now nearly eight times current liabilities: all bank loans have been paid, amounting in all to $500,000: operations during 1926 resulted in a net profit of $271,403.66 before providing for depreciation and inventory adjustment, compared with a loss of $77,-624.57 for 1925; sales during January and February show a gratifying increase over those for the same months last year.

Besides drastic changes in personnel and methods, a feature of the President's policy has been a renewed interest in certain of the Company's patents, notably those protecting a non-inflammable, flexible product, suitable for film, dental and surgical purposes.

The letter announced with regret the resignation of Marshall C. Lefferts, a member of the Board of Directors. Mr. Lefferts has held the offices of president, secretary and chairman of the board and saw service with the Company's predecessor, The Celluloid Manufacturing Co.

(*Continued on page 175*)

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Artistic and Practical

THE designer of novelties is an artist. Inda is a medium that will give his artistic ideals full scope. This perfected casein solid is made not only in many lovely solid colors, but also in tortoise, jade and rare mottles both metallic and non-metallic.

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Bakelite Wins Decision over Brunswick-Balke-Collender Company

"Heat and Pressure" patent held infringed by decision reversing lower court

THE United States Circuit Court of Appeals for the Third District has rendered a decision dated March 3rd in favor of Bakelite corporation, as against the Brunswick-Balke-Collender Company, in a review of patent litigation pertaining to the manufacture of billiard balls.

Bakelite Corporation originally made complaint in the District Court of Delaware, and after a lengthy review of the chemistry and engineering technique involved, Judge Morris returned a decision to the effect that there was no infringement, thus dismissing the case. A full report of this was detailed in PLASTICS for January 1926, Vol. 1, p. 27, under the caption "Bakelite Patents Held Not Infringed."

Appeal to the higher Court resulted in a finding for Bakelite Corporation. Rendering the Court of Appeals' decision Judge Buffington said: "Convinced as we are that the defendant's use of identity of ingredients and identity of means, with those which alone are specified in the recited claim, that by such use they obtain identity of result, namely, a synthetic billiard ball, 'hard, insoluble and infusible,' a product first disclosed by this patent, we are justified in adjudging Patent No. 942,699 valid and infringed."

The validity of the patent in question has been sustained in court actions in the past. Issued to Dr. L. H. Baekeland, it was later assigned by him to the Bakelite Corporation, of which he is President. The invention relates to the production of hard, insoluble, and infusible condensation products of phenols and formaldehyde.

Reaction upon the phenolic body with formaldehyde is described as yielding a reaction product which is capable of transformation by heat into an insoluble and infusible body; this reaction product either alone, or compounded with suitable reinforcing material, being subsequently changed into such insoluble and infusible body by the combined action of heat and pressure. The result is a hard, compact, thoroughly uniform mass, similar in its properties to ivory. It is insoluble in alcohol, and acetone, and is resistent to heat, or infusible, also resistant to moisture and most chemical reagents.

Baekeland, an honorary professor at Columbia University, and internationally known for researches in several fields of chemistry, is the author of the phenol resinoid industry. This relatively new industry has rapidly attained a place of importance in this country and abroad. Moreover, through the invention of Bakelite resinoid by this American inventor, the United States has led the world in a wholly new and broadly useful industry.

Investigations for Court

Investigations in connection with the Court of Appeals decision disclosed the fact that in all of the great record of chemical investigation along lines in view, there was no evidence that any one before him had produced commercial synthetic billiard balls similar in their properties to ivory. The invention was of a new product in an untilled field, and was "really a remarkable contribution made to one of civilization's centuries old sports."

With respect to a second patent under discussion, having to do with the addition of organic or inorganic bases to the phenol formaldehye reaction, the defendant was found not to infringe. This finding, however, is regarded as of secondary importance, in view of the general refutation of the Brunswick - Balke - Collender claims which decision on the "heat and pressure" patent involves.

The Bakelite vs. Brunswick suit has been a subject of considerable interest among scientific circles and the recent ruling of the Court of Appeals is bound to receive extensive quotation whenever patent cases of similar bearing are at issue.

Fiberloid vs. "Fiberoid"

Trade Mark Interference Decided

IN a Trade-mark opposition case, decided by the Commissioner of Patents on April 12, 1926, an appeal from the Examiner of Trade-Mark Interferences, but only published in the March 1st issue of the Official Gazette of the U. S. Patent Office, it was held that the term "Fiberoid" used by one David Mayer for a ready-mixed paint was sufficiently like the Fiberloid Company's corporate name to cause confusion in the public mind and hence the registra-

(*Continued on page 182*)

Ask Me Another!

(*Continued from page 165*)

ed by about fifty percent of the readers; or have reference to some obscure event or personage which has contributed little, if anything, to human progress. Be that as it may, however, it is a certain index, as it were, of the amount of reading done by the public that is interested in this pastime.

It occurs to us that something along the same lines in the Plastics industry would not be so much amiss, as we have found that much fundamental knowledge in this field is highly conspicuous by its absence among the rank and file of the industry. Without any conceit, or "malice aforethought," we must confess that we have seen some things in the industry that are surprising, to say the very least. Whether it is due to a deliberate (?) lack of knowledge, or because of a dearth of information on the subject remains to be seen.

So, just for the fun of the thing, "Answer me this"

1. What is the difference between phenol and carbolic acid?
2. Who discovered pyroxylin, and when?
3. Name five American manufacturers of phenol resins.
4. Who are the following, and what are they noted for: (a) Hyatt; (b) Schuetzenberger; (c) Spill; (d) Aylsworth; (e) Spittler?
5. Is casein naturally a solid?
6. What has Velox and Bakelite in common?
7. Name three animal products used for making plastics.
8. Name three vegetable products used for making plastics.
9. What is furfural?
10. Who is the present president of the Celluloid Co.?

Now you tell one.

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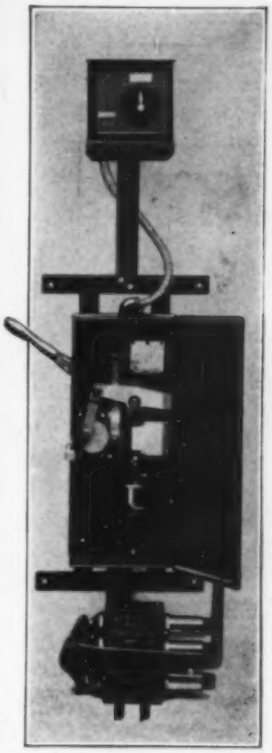

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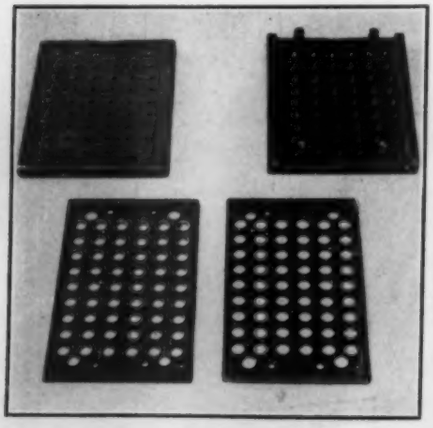
Shaping Celluloid Articles

(*Concluded from page 157*)

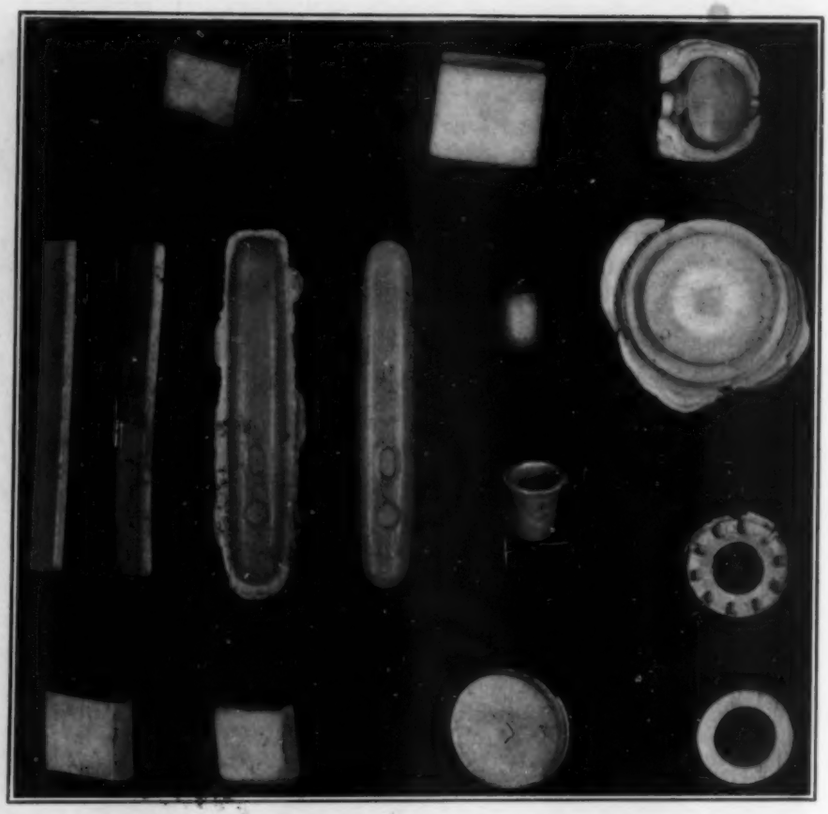
Illustration depicts in order starting from the top left hand corner:

Tumbled blank for banjo key cut from sheet stock and drilled: tumbled blank from sheet stock: banjo key blank after pressing: blank for knife scale cut from sheet stock: the same after tumbling to remove the burred edges: the blank after pressing with the fin still attached: the completed knife scale: tumbled blank for thimble consisting of a piece cut from a rod and the completed thimble with a small fin still attached: register wheel pressed from the blank mentioned above with the fin still attached: a blank for a wheel consisting of cut sheet stock: the same after tumbling: the same after pressing with fin still in position: blank for register wheel consisting of a piece sawed from a tube together wi h the pressed wheel.

The fabrication of articles from pyroxylin plastics is so extensive a field, that in a future issue of Plastics, we propose to deal with the machining of celluloid and other processes involved in this industry. Although the newer plastic materials are bringing about a state of keen competition, yet the pyroxylin plastics will surely maintain their position, at any rate in a field peculiarly their own.



Four plate typewriter key mold.



Bakelite Corporation Enters Agreement With German Concern

The German periodical, Gummi-Zeitung, is responsible for the statement (1927, 41,1081), that the German firm known as the Bakelit-Gesellschaft m.b.H, the majority of whose stock is owned by the Rutgerswerke-Aktiengesellschaft, has entered into a long term agreement with the Bakelite Corporation of the United States.

According to this agreement, all information relative to experiences, processes, inventions and patents is to be exchanged between the two companies, particularly as to the uses and manufacture of artificial resins and plastic materials. This is in accordance with earlier arrangements between the two concerns, but the present exchange of information is to be on a much wider and more complete scale. It is expected that this will redound to the benefit of the consumers of phenol resins, and especially to the electrical industries.

Actual Application of the Casein Solids

(*Concluded from page 157*)

Knife Handles
Knitting Needles
Lavatory Pulls and Levers
Lip Stick Holders
Lorgnette Holders
Manicure Instruments
Manicure Stands
Manicure Stick
Match Stands
Medallions
Napkin Rings
Needle Case Holders
Paper Cutters
Pencil Barrels
Penholders
Photograph Frames
Piano Keys
Pipe Racks
Poker Chips
Radio Parts
Razor Handles
Reading Glass Frames
Revolver Handles
Salt Cellars
Small Ornament Boxes
Shoe Horns
Switch Board Keys
Thermometer Backs
Toilet Articles
Toilet Paper Holders
Tongue Depressor
Tooth Brush Stands
Towel Racks
Umbrella Frame Tips
Umbrella Handles
Vanity Cases
Wool Winders

Celluloid Co.'s Reorganization Success

(*Concluded from page 170*)

We quote Mr. Campbell's closing words:

"Never has your president been connected with an organization which has worked harder or which has shown better results than the men with whom he is now associated. Each is well trained in the line of work for which he is responsible, and it would seem almost unbelievable that with the effort which they are putting into their work and the complete harmony which now prevails, satisfactory results should not be shown by the end of 1927."

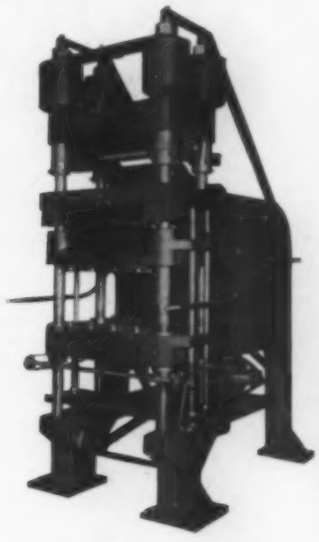
Resorcinol-Starch Films

(*Concluded from page 159*)

Thus it will be seen how simple the matter appears to be. In my particular branch of industry we stir the starch with cold water, then boil it in steam-jacketed copper kettles, and stir the paste until cold. It may be that any kind of starch will give the results, but that some types may be better than others. We usually employ a mixture of starches. The stearic acid and other fats are added to yield a smoother paste. Occasionally dextrin and British gum are employed. What remains to be determined is which starches or mixtures give the best results. Quite evidently chemically modified starches will give different reactions, and these may perhaps not be as suitable as unchanged starches. A further point to be determined would be the proper temperatures.

I have since found some literature on the subject: Friedlaender Vol. 11, p. 1211-1212; German Patent 268452, 1912, of Armin Hochstetter in which it says that "Resorcinol dissolves mannite, cane sugar, and even starch and cellulose." This disclosure does not, however, state that films can be formed in this way.

"The further development of the lines thus opened may be of interest to research workers in this field. Ed.)



Terkelsen Mechanical Spring Press
Type A-1 Model 100

Specifications

Capacity	*100 tons*
Working Area of Platens	*25"x21"*
Stroke	*12"*
Maximum Adjustment of Lower Die Block	*10"*
Automatic Knockouts	
Motor	*2 H. P.*
Approximate Weight	*8,000 lbs.*

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Features

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2—Uniform pressure rigidly maintained.

3—Pressure regulated from one ton to capacity.

4—Powerful mechanical movement with cam and compound gearing.

5—No water leakages.

6—May be operated independently from other equipment.

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8—May be used as semi-automatic or plain presses with hand operated moulds.

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TECHNICAL ABSTRACTS
AND PATENT REVIEW

The Nitration of Cellulose. R. Gabillon, Revue generale des matieres Plastiques, 1927, 3, 15-27.

The present article is a continuation from the above journal of Aug., 1926. It is a detailed theoretical and experimental study of the effect of various types of nitrating bath upon the viscosity and nitrogen-content of cellulose nitrate; the effect of washing and stabilization; solubility of the nitrate in alcohol; heat test, etc.

The properties of the cellulose nitrate as affected by the type of cellulose employed for nitration is also taken up. The article is to be continued.

The Manufacture of the Pyroxylin Plastics. Michel Reclus, Revue generale des matieres Plastiques, 1927, 3, 29-35.

This is a continuation of an article from the above French journal of June, Aug., Sept., and Oct., 1926. In the present installment, the preparation of cellulose nitrate from woodpulp is described, and illustrated by a number of laboratory nitrations. The results are discussed and also given in tabular form, especial attention being given to the production of a cellulose nitrate or pyroxylin suitable for making plastic materials. (To be continued).

German Patents and Patent Applications on Phenol Resins. Dr. Aladin. Kunststoffe, 1927, 17, 9.

This is the conclusion of a series of short abstracts of the German patent literature on the production of the synthetic resins from phenols and aldehydes. Besides giving the patent numbers, references to Friedlaender, where the complete patents can be found, are given, so that any one interested can readily look up the patents in question. The list should prove of considerable value to searchers in the art of these synthetic materials. Cross references, as well as patent applications which never matured as patents are given. The article closes with an index to the patents reviewed, which have been numbered consecutively for easy reference.

Dielectric Material. (A Book). By Dr. Ing. A. Bultemann, Berlin, 1926, pub. by Julius Springer. 12 Mark.

According to a review in Kunststffe, 1927, 17, 19, this volume covers the production, testing and use of all of the known dielectric (or insulating materials), inclusive of the molded phenol resin products, porcelain, hard-rubber, etc. The reviewer is quite enthusiastic over the work which should prove of considerable interest to the electrical trade in particular.

The Casein Solids Industry. Marc Fontaine, Revue generale des matieres Plastiques, 1927, 3, 37-41.

A description of the extrusion and forming of casein solids, including a review of the more important European patents in this field; illustrated by malaxating rolls, extrusion presses, etc.

Ophthalmic Mounting. E. L. Schumacher, assignor to American Optical Co., Southbridge, Mass. U. S. P. 1,613,202; Jan. 4, 1927.

Concerns an eyeglass frame consisting of a combination of a metallic rim with a pyroxylin covering. A pyroxylin plastic tube of proper cross section is formed by extrusion, is split on one side and then snapped over the metallic rim.

Plasticizing Cellulose Esters. M. P. Schmidt and J. Voss, and the firm of Kalle & Co.,, Biebrich, Germany. German Patent 434640; appl. Aug. 5, 1923.

Ethers or thioethers of the esters of glycolic acid or of their homolgues are employed as cellulose ester plasticizers. Particular mention is made of the amyl and cyclohexanol esters of thiodiglycolic acid and of diglycolic acid. These products are said to be excellent cellulose ester solvents and to yield stable, plastic masses.

Glass Substitute From Cellulose. G E. Griswold, French Patent 608387.

Cellulose fibers, as for example cotton, is treated with a 5 or 10% sodium hydroxide solution, thoroughly washed with water to remove excess alkali and is then bleached with chlorine gas. The bleached cellulose thus obtained is gelatinized by means of a solution of cuprammonium and the solution then mixed with a solution of rubber in turpentine and carbon tetrachloride. A small amount of ammonia is added, followed by several parts of a choloronaphthalene carboxylic acid, which acts as a plasticizing agent. The finished mass is transparent, waterproof and scarcely combustible, so that it may be used in place of glass.

Connecting Phenol Resin Products With Other Bodies. A C. Wisner, assignor to Revnolds Spring Co., Jackson, Mich. U. S. P. 1,606,680; Nov. 9, 1926.

The object of the invention is to provide means whereby phenol resin plastics having hard, non-porus, smooth surfaces may be united to other bodies by means of cement, glue, etc. The process is illustrated by an umbrella handle. Metallic mesh, having an interlaced metallic filament in addition to the mesh, is molded into the surface of the article during the molding operation so as to provide a surface to which glue or cement will adhere. In forming the article, the wire-mesh or other fibrous material will be laid on the face of the mold, if the article be in sheet form, or folded or bent about it to have an interior face or faces provided with the invention. The phenol resin plastic is then introduced into the mold and the article formed in the usual way. The retaining member will be held away from the surface of the mandrel or mold by the cords or strips on its face, and the retaining member will be completely imbedded in the plastic material by the flow of the latter to the faces of the mold.

Molding Powder Prepared From Rubber Isomers. Harry L. Fisher, assignor to B. F. Goodrich Co., New York. U. S. P. 1,605,180; Nov. 2, 1926.

Rubber is mixed with certain reagents to produce either (a) products resilient and similar to soft vulcanized rubber; (b) harder, tough heat-plastic products resembling balata; and (c) hard, friable products which soften or fuse at low temperatures and which are similar in many respects to shellac, for which they may be substituted in compositions such as phonograph records, molded electrical insulators, etc.

Example. To prepare a hard, brittle, pulverized shellac-like rubber derivative, masticate 100 parts of rubber on a mill and gradually add thereto during the working a mixture of 8 parts of para-toluene sufonic acid, 2 parts concentrated sulfuric acid and 2 parts of water. When the reagent has been thoroughly dispersed in the rubber, the latter is removed and heated in a thick mass in an oven for 8 hours at 140 degrees C. A exothermal reaction sets in, and the temperature rises to 250 degrees or higher. The weight loss represented in vapors and gases driven off during the reaction is about 6 to 7%. The source of heat is then cut off and the mixture permitted to cool in the oven.

Alternatively, for the para-toluene sulfonic acid and sulfonic acid one may substitute (a) para-toluene sulfonyl chloride 11 parts, sulfuric acid 2 parts; (b), para-toluene sufonyl chloride 9 parts, para-toluene sulfonic acid 2 parts and similar analogous substances.

The hard, brittle product in thick sheets or lumps is an amorphous, brownish-black or jet-black body and breaks with a conchoidal fracture. It softens at 50 to 65° C, slowly changes to a viscous mass at 90 to 120°C, and melts at about 275°C. Its tensile strength compares favorably with shellac, ranging up to about 570 pounds per sq. in.

Recent Books

Casein and Its Industrial Applications

By Edwin Sutermeister; 296 pp., price $5.00. Chemical Catalog Co., New York, 1927.

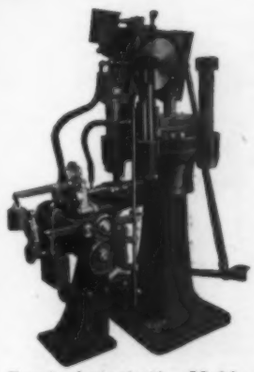
NO 30 in the Series of American Chemical Society Monographs, this volume is the result of contributions from eleven authors, many of whom are widely recognized authorities. Owing to the versatility of casein, a wide range of subjects is covered, and in this review, we propose to touch only on those portions bearing directly on the casein solids.

The first two chapters deal with organic and physical chemistry, subjects of much difficulty and doubt. An instance of the uncertainty still surrounding this much investigated protein, is the question of the molecular weight, which hovers between the far from narrow limits 12,800 and 192,000. Rennet casein, at present the variety of greatest interest to the plastics industries, is regarded as chemically identical with paracasein, although there would appear to be some physical differences. The action of various reagents is then given, together with a brief account of the action of formaldehyde. Very important among the physical properties is viscosity, depending not only on the concentration but also on the volume of the casein molecules, i. e. on the swelling.

Chapter 3 is an illustrated account of the manufacture of casein from skim milk. Precipitation by lactic ("self-sour"), sulphuric, and hydrochloric acids and by rennet are treated, the latter rather briefly. Then follows a discussion of the properties of the various caseins and their differences. Outstanding among the latter is the ash value, which is as high as 8.00 percent for rennet casein and between 2.78 and 4.52 for other forms.

No less an authority than Dr. George H. Brother contributed the 26-page section on casein plastics, an application which shows every evidence of becoming one of the most important. Although a Brooklynite, E. E. Childs, appears to have secured the first patent in 1885, a demand for a white "black-board" led to the development of the industry in Germany. Manufacture by the wet and dry processes are outlined, the dry process using rennet casein being the later improved method. The production of a transparent product is then gone into, followed by a discussion of the chemistry, characteristics, applications and possibilities of the casein solids. An outstanding advantage of the casein comb over one made of hard rubber is the non-formation of an electrical charge during use.

Chapter 3 is devoted to the storage of casein, a subject of some importance owing to the dangers of infestation by mites, vermin and rodents. The proper methods of warehousing and preventive spraying measures are dealt with.



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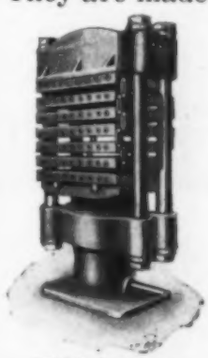

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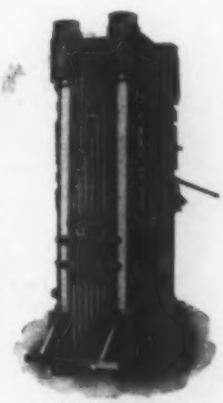

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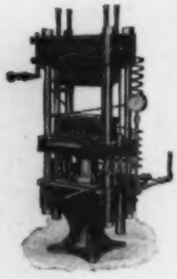

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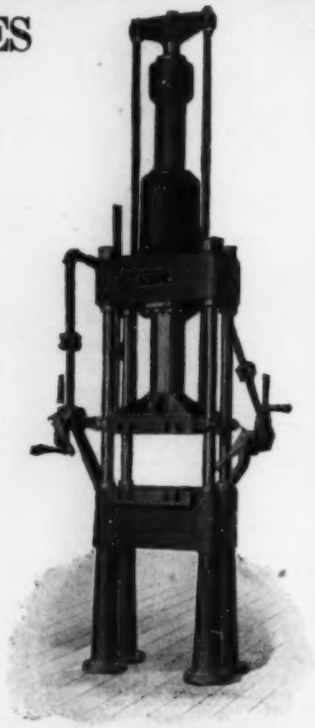

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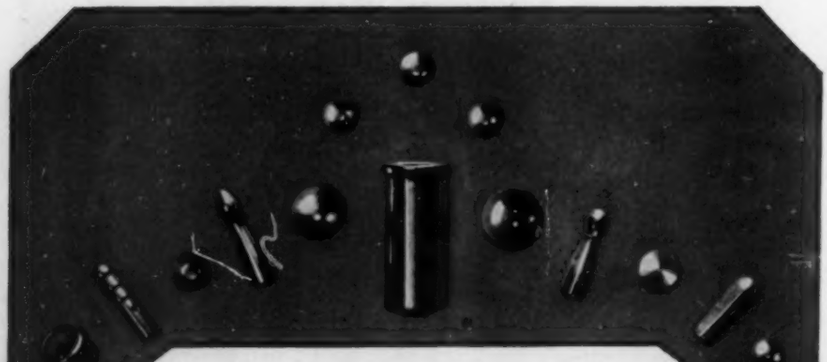

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The book includes chapters on casein base paints, casein in paper making, medicine, foods, and a lengthy treatment of casein glues. A chapter on testing brings to a close a volume containing a close-packed wealth of essential information, one which should prove of much value to all interested in the ever-widening field of casein and its applications.

What Price Progress? The Stake of the Investor in the Discoveries of Science.

By Hugh Farrell. G. P. Putnam's Sons, New York, 1926. 317 pp.

About a year ago the author published a series of articles in the **New York Commercial** under the title "Does Research Pay?", and the present work is an elaboration upon this theme. It sets forth in lucid terms, and in language that the non-technical reader can readily follow, the remarkable progress that has been achieved in modern industry as the result of applied research.

Practically every large industry is discussed from this angle, and a glowing tribute is paid to the research which has made this progress possible. At the same time the writer issues a warning to industry that unless it is willing to keep up this intensive research that there can be no hope of lasting improvement, but that the Price of Progress is continued research.

Even for the absolute layman, this volume will make interesting reading, and to one gifted with even a small amount of constructive imagination it will prove as attractive as a novel. The individual chapters deal with Science and the Investor; Heat, Power and Light; Coal and Conservation; Gas and Gas Engines; Iron, Copper and Aluminum; Paint, Silk Stockings and Dynamite(in which the utilization of pyroxylin for artificial silk, plastics and smokeless powder is taken up); Rubber, Cement and Fertilizers; Packing and Tanning; Sugar, Milk and Alcohol (which incidentally touches upon the Casein solids industry); Pure Foods and Drugs; Phonographs, Photographs and Philanthropy (which discusses the work of the Eastman Kodak Co., and the phonograph plastics); Science and the Railroad; Great Industrial Laboratories; Does Research Pay; and Fundamental Research."

Those who are interested in plastic materials, will find pertinent passages on the cellulose nitrate lacquers on p. 124, where the pyroxylin finishes for automobiles are mentioned; p. 106 on the phenol resins such as Bakelite; ethyl acetate and similar solvents on p. 189; and casein on p. 197.

A particularly striking statement occurs at that point, where it is shown that the United States produces "something like 25,000,000,000 pounds of skim milk per year, which has a casein content nearly as great as the butter-fat content of whole milk, yet we produce only about 15,000,000 pounds of casein. This same skim milk has a milk-sugar content that is greater than the butter-fat content of whole milk, yet, in

1923, we produce less than 3,000,000 pounds of milk-sugar. At the time that we were throwing away the greater part of our production of skim milk and the casein that it contained, we were IMPORTING nearly 30,000,000 pounds of casein; twice as much as we were producing. It can't be said that there is no market for casein—there is both a market and a tariff which protects the home industry".

Furfural also comes in for mention; and the casein solids as Karolith are mentioned by name on p. 202. It can safely be said that no one who has the best interests of the continued progress of our industries at heart can do without this truly inspiring book, and it is hoped that it will receive the large circulation which it merits. The Chemical Foundation has undertaken the task of distributing this work, and it is being offered for a limited time at only one dollar, whilst its regular price is $2.50.

Plastics From Sea Weeds

(*Continued from page 166*)

"Tanginic acid," from the German "Tang-saure." Krefting, in his articles on the subject (in the Chemische Industrie and in his patents,) calls it both "Tang-acid" and "Tangic acid." However, the material is practically identical, though perhaps purer than the original substances prepared by Stanford in 1883.

In Norway, the material has been commercially exploited by a series of concerns, such as the Norsk Tangsyndicate, Norsk Tangaktiebolaget and their successors, the present organization being known as the A.-S. "Tangin." The French branch of the concern calls the same material by the name of "Norgine," and it is under the latter name that it has assumed considerable technical importance.

Algin, Tangin, or Norgine (which are simply different names for the same material), is a form of carbohydrate material, i. e. it consists of carbon, oxygen and hydrogen. Except in the form of its sodium, ammonium, potassium or magnesium salts, the material is insoluble in water. The sodium salt for example, is soluble in water to yield a solution which is from 14 to 30 times as viscous as a starch solution of equal concentration, and the solution has

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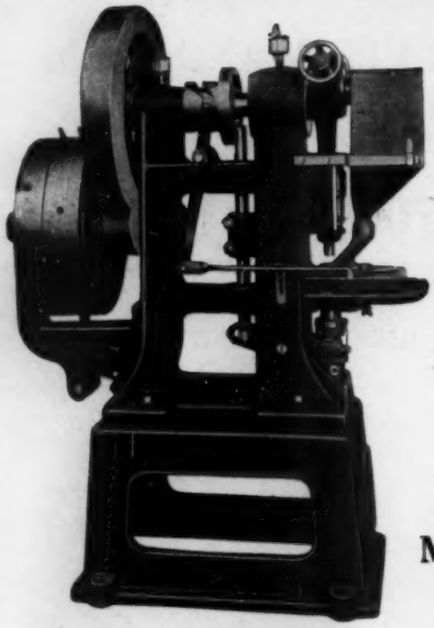

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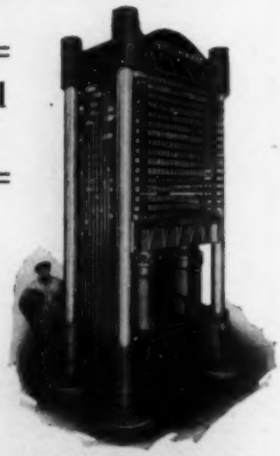

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very marked agglomerating properties. By treatment with acids or calcium salt solutions, the Algin, Tangin or Norgine can be re-converted into the insoluble form.

It is based on this reaction that the value of the material for the manufacture of plastic materials is based. A large number of patents have been taken out during the past 30 years in this field, but it is only recently that any commercial success has been attained. A large plant has just been completed on the Pacific Coast, where the production of sizing material and binders for plastics is being carried on.

Simply for purposes of illustration, to show what can be done with the substances extractable from the sea-weeds by means of alkali treatment, we will quote from a patent granted last October to C. C. Loomis and A. L. Kennedy, assignors to the Kelp Products Co., of New York (U. S. P. 1,603,783).

According to this patent "Loomis and Kennedy have discovered that if these algin containing materials are dried and pulverized to a fine powder, and then moistened with a minimum amount of water or aqueous solution of ammonia, or alkali hydroxide or carbonate, and then subjected to pressure in a mold, a hard homogeneous mass is obtained which contains so little water that there is only a slight shrinkage in bringing it to complete dryness, and warping is almost wholly obviated. At the same time any suitable filler can be incorporated by thoroughly mixing with the dried powder before moistening and molding under pressure.

Example 1.

Fifteen parts of kelp leaf are dried and ground till they will pass through a 100 mesh screen. The resulting powder is then moistened with 5 parts of 28% ammonia solution and thoroughly mixed so that the moisture is evenly distributed. Powder still appears quite dry and does not agglomerate except under pressure. It is now transferred to a mold, and a pressure of several tons applied to it,

for a few minutes. On removal from the mold, the mass is quite hard and homogeneous. It should be allowed to cure for several days, however, to develop much strength. In this curing the moisture slowly evaporates and there is a slight shrinkage, but this is negligible as compared with the old methods. In place of ammonia, solutions of other alkali hydroxides or carbonates can be used.

Example 2.

Fifteen parts of the dried copper compound of the entire kelp leaf, made either by direct treatment of the leaf with a solution of a double copper salt, or by double decomposition of a mixture of kelp leaf and an alkali hydroxide or carbonate solution with a soluble copper salt ,is ground to 100 mesh and moistened with 5 parts of 28% ammonia. It is then thoroughly mixed and molded under pressure.

Similarly other salts of the kelp can be dried, ground and then moistened with a minimum amount of either water or a water solution of an alkali hydroxide or carbonate and then molded under pressure.

Also the so-called alginic acid or alginates made by extracting kelp leaves with alkali and filtering from algulose and other organic constituents, can be dried, ground, moistened, and then molded under pressure in a similar manner.

It is also possible to take the precipitated salts, squeeze as much water as possible out of them, break up the cake, dry further in a humid atmosphere to prevent crustings till the moisture content has been lowered to about 25%, disintegrate, and then mold under pressure."

The kelp beds of the Pacific are capable of yielding immense quantities of the sea-weeds suitable for carrying out such processes, and it is also known that very large quantities are available along the shores of Massachusetts. The industry is still new, at least from the angle of plastics, but if properly and scientifically developed, it should prove to be a profitable ven-

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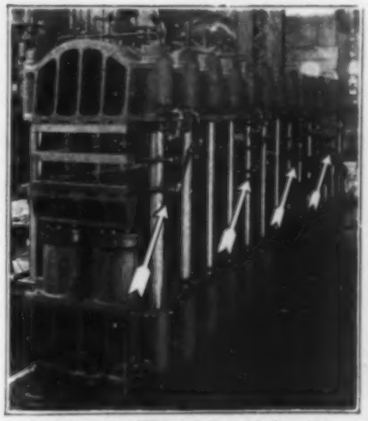

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ture. The gathering of the weeds is comparatively simple, and in the west, at least, has been successfully done mechanically with scows and specially built under-water cutters and conveyors. In Massachusetts the weeds are either picked up along the shore after a storm, or raked from rocky ledges near the shore from boats, by means of iron rake-like implements.

Material for a more complete resume of the known state of this art is being collected, and it is hoped to give shortly a concise resume of the patents and articles on the manufacture of plastic masses from algin compositions.

Fiberloid vs. "Fiberoid"

(*Concluded from page 172*)

tion of the mark "Fiberoid" was denied. The Examiner of Trade-Mark interferences had held that inasmuch as the goods in question were entirely different, and on account of the fact that the paint made by Mayer was a mixture of asbestos fiber and gilsonite asphalt that the term was properly descriptive of the nature of the product, that the mark could be registered.

The Fiberloid Co. appealed and the Examiner of Trademark interferences was reversed. One of the deciding factors in the Commissioner's opinion was the fact that the Fiberloid Co. is selling a pyroxylin lacquer bearing that name, and that in the field of coating materials there would be a confusion between the two names "Fiberoid" and "Fiberloid", and therefore decided to withold registration from Mayer on his fibrous paint.

Fifteen-fold Increase in Casein Imports from New Zealand.

A NOTEWORTHY increase in the American imports of casein from Auckland, New Zealand took place during 1926. In 1925, 2,245 lbs. value $326 were exported, compared with 33,740 lbs. value $4,918 for 1926.

General Insulate Co in Merger

THE General Insulate Company, Inc., has been acquired by Insulation Manufacturing Company, Inc., (Electrose Products) of 70 Washington Street, Brooklyn, N. Y. and will be continued as a Department of the new owners under the name General Insulate Company, Inc. With the merger of these two plants, each company will continue to specialize in Bakelite and various kinds of molded products and insulators.

Statement of ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of Plastics published monthly at Washington, N. J., for October 1, 1926.

State of New York, County of New York, ss.: Before me, a Notary Public in and for the state and county aforesaid personally appeared Sylvan Hoffman, who, having been duly sworn according to law, deposes and says that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse of this form, to wit:

1. That the names and addresses of the publisher, editor, managing editor, and business managers are:

Publisher, Sylvan Hoffman, 471 Fourth Avenue, New York City; editor, Carl Marx, 471 Fourth Avenue, New York City; business manager, Allan S. Cohen, 471 Fourth Avenue, New York City.

2. That the owner is: (If owned by a corporation, its name and address must be stated and also immediately thereunder the names and addresses of stockholders owning or holding one per cent or more of total amount of stock. If not owned by a corporation, the names and addresses of the individual owners must be given. If owned by a firm, company, or other unincorporated concern, its name and address, as well as those of each individual member, must be given.) The Hoffman Publications, Inc., Sylvan Hoffman, Della Hoffman, Mary Greenberg, Allan S. Cohen, all of 471 Fourth Avenue, New York City, N. Y.

3. That the known bondholders, mortgagees, and other security holders owning or holding one per cent of total amount of bonds, mortgages, or other securities are: (If there are none, so state.) None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full is given; also that the said two paragraphs knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

SYLVAN HOFFMAN,
(Signature of Publisher)

Sworn and subscribed before me this 19th day of March, 1927.

(SEAL) GUSTAV COHEN,
Notary Public

My commission expires March 30, 1928.

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European Toilet-Ware

(*Concluded from page 162*)

hindered by protective tariffs. A little hope was entertained on account of the vogue of pyroxylin plastic fasteners for ladies' handbags, but even this style is passing away. The European toilet-ware industry, on account of too high prices, is in a very bad way.

The formerly very prosperous fan business is suffering severely for new German and Italian competition, and as far as buttons are concerned, the casein plastics have practically replaced pyroxylin entirely, only a few small plants in Czecho-Slovakia are still mak-pyroxylin plastic buttons. Piano keys are again being made almost entirely from natural ivory, as the present high price of pianos in Europe does not make it necessary to use artificial materials. The musical instruments and cutlery trades are demanding new styles, especially imitations of agate, batik, and fancy colors and effects. The extremely high cost of getting out these new designs has taken away all the expected profit.

The center of the pyroxylin plastic industry in Austria is at Gablonz, where a great many small plants and home-workers are employed, especially for the production of cheap jewelry, bracelets and toys.

The (anonymous) writer of the article says that the European manufacturers have much to learn from the Americans, and proposes that the producers of the raw pyroxylin plastics should jointly advertise the virtues of this material, with the slogan "Use Pyroxylin Plastics." He also proposes a line of advertising to eradicate the deeply ingrained prejudice against the material on account of its alleged fire hazard, which, he claims, is very much exaggerated. He closes with the prophecy that the lowest point of depression in this industry has practically been reached and that better times are in view.

Preforming Presses

(*Continued from page 162*)

In order to minimize power consumption and the wear on the dies, it is advisable to use the lowest pressure in preforming that is permissible to secure the desired results. To accommodate a variety of sizes in tablets, the machine is provided with a special form of pressure regulator which can be adjusted to suit the product desired.

The machine follows closely the accepted design used in straight side power presses with massive construction throughout. Provision is made for wear take-up in all moving parts and accessible oiling equipment is provided to insure proper lubrication. At the main slide connection there is provided a thrust screw adjustment, so that the vertical clearance of the dies can be readily corrected to suit working conditions. The bottom punch holder is also provided with a vertical adjustment so as to vary the depth of the powder charge in the dies. The ejector mechanism has also a simple means of vertical adjustment so that the completed tablet will be ejected to a proper level for automatic discharge.

A very desirable feature of the machine will be found in the arrangement of clutch mechanism. This is so designed and located that the operator can stop the machine at any position of stroke. This feature is of exceptional value when adjusting dies, or to prevent injury to the dies in case of some foreign particle finding its way into the powder cavity.

The die holders are designed to accommodate die blocks up to 5½" in width by 10½" in length, so that irregular shapes of tablets can be readily accommodated. Where small tablets are required, it will be found feasible to use multiple cavity dies so as to make several tablets at one operation.

By experience it has been found that a satisfactorily dense tablet can be made by this

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machine with considerably less pressure than is possible in such machines as apply pressure on the tablet from one side only; a pressure of 30 tons giving the identical results that were obtained from 40 tons pressure with a stationary bottom in the dies.

Characteristics of the Presses

From the various grades of phenol resin and similar compounds, a pressure of approximately from 4 to 5 tons per square inch of the die surface is quite ample for satisfactory tablets except where great irregularity of shape demands somewhat higher unit pressure. For ordinary circular tablets, this machine is recommended for such tablets up to about 3½" in diameter and accurate adjustment is provided to reduce this powder depth to any amount desired. The main characteristics of the press are:

Rated Pressure Capacity of Machine 35 tons.

Floor Space, 68" x 48".
Overall Height, 8' - 6".

Approximate Weight Pounds, 8200.

Operating Speed from 12 to 25 strokes per minute.

As an illustration of the sturdy construction of this machine, it may be mentioned that the main shaft, which is a single piece steel forging, is carried in hand scraped journal boxes.

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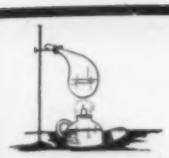

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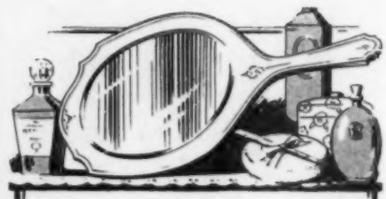

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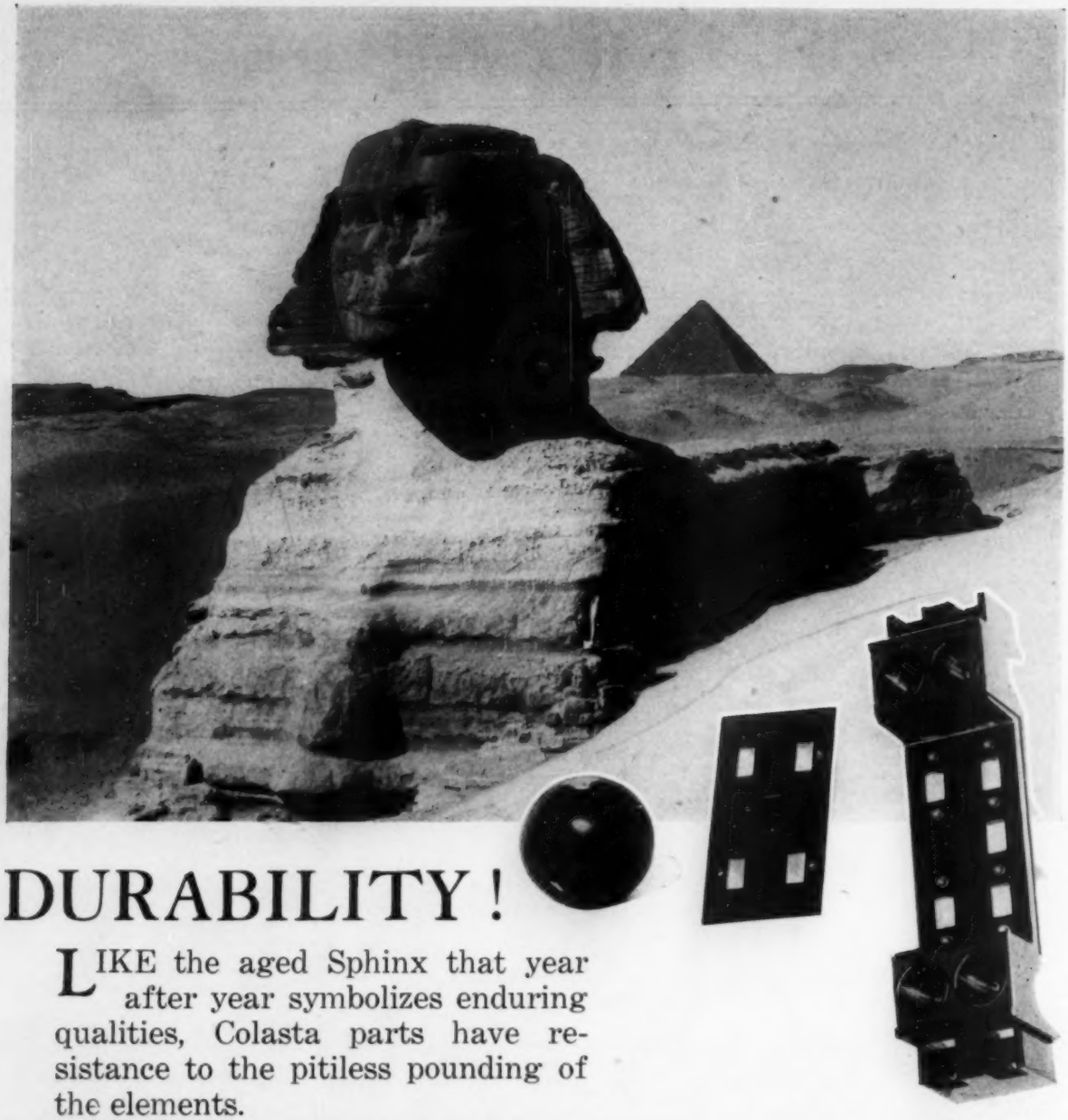

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